SONY

RECORDER UNIT

# DNV-5

DIGITAL CAMCORDER

# DNW-7/7P
# DNW-90/90P
# DNW-90WS/90WSP

BETACAM SX

MAINTENANCE MANUAL Part 2

Volume 1 1st Edition

## ⚠警告

このマニュアルは，サービス専用です。
お客様が，このマニュアルに記載された設置や保守，点検，修理など行うと感電や火災，人身事故につながることがあります。
危険をさけるため，サービストレーニングを受けた技術者のみご使用ください。

## ⚠WARNING

This manual is intended for qualified service personnel only.
To reduce the risk of electric shock, fire or injury, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

## ⚠WARNUNG

Die Anleitung ist nur für qualifiziertes Fachpersonal bestimmt.
Alle Wartungsarbeiten dürfen nur von qualifiziertem Fachpersonal ausgeführt werden. Um die Gefahr eines elektrischen Schlages, Feuergefahr und Verletzungen zu vermeiden, sind bei Wartungsarbeiten strikt die Angaben in der Anleitung zu befolgen. Andere als die angegeben Wartungsarbeiten dürfen nur von Personen ausgeführt werden, die eine spezielle Befähigung dazu besitzen.

## ⚠ AVERTISSEMENT

Ce manual est destiné uniquement aux personnes compétentes en charge de l’entretien. Afin de réduire les risques de décharge électrique, d’incendie ou de blessure n’effectuer que les réparations indiquées dans le mode d’emploi à moins d’être qualifié pour en effectuer d’autres. Pour toute réparation faire appel à une personne compétente uniquement.

| | |
|---|---|
| DNV-5 | Serial No. 10001 and Higher |
| DNW-7 | Serial No. 10001 and Higher |
| DNW-7P | Serial No. 40001 and Higher |
| DNW-90 | Serial No. 10001 and Higher |
| DNW-90P | Serial No. 40001 and Higher |
| DNW-90WS | Serial No. 10001 and Higher |
| DNW-90WSP | Serial No. 40001 and Higher |

**CAUTION**

Danger of explosion if battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer's instructions.

**Vorsicht!**

Explosionsgefahr bei unsachgemäßem Austausch der Batterie.

Ersatz nur durch denselben oder einen vom Hersteller empfohlenen ähnlichen Typ.
Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

**ATTENTION**

Il y a danger d'explosion s'il y a remplacement incorrect de la batterie.

Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur.
Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

**ADVARSEL!**

Lithiumbatteri-Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Levér det brugte batteri tilbage til leverandøren.

**Voor de klanten in Nederland**

Dit apparaat bevat een $MnO_2$-Li batterij voor memory back-up.

Raadpleeg uw leverancier over de verwijdering van de batterij op het moment dat u het apparaat bij einde levensduur afdankt.

Gooi de batterij niet weg. maar lever hem in als KCA.

Bij dit produkt zijn batterijen geleverd. Wanneer deze leeg zijn, moet u ze niet weggooien maar inleveren als KCA.

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# Manual Structure

## Purpose of this manual

This manual is maintenance manual of Recorder Unit DNV-5 and Digital Camcorder DNW-7/7P/90/90P/90WS/90WSP.
This manual describes the information items (parts replacement and electrical adjustments) that premise the service based on the components parts.

## Contents

The following is a summary of the sections for understanding the contents of this manual.

### Maintenance Manual Part 2 Volume 1

**Section 1 Service Overview**
Explains the information for extension boards and fixtures for adjustment.

**Section 2 Maintenance Mode**
Explains the SETUP menu (in SVC mode) and DIAG menu of this unit.

**Section 3 Parts Replacement**
Explains how to replace the mechanical parts.

**Section 4 Mechanical Alignment**
Explains how to adjust the mechanical parts.

**Section 5 Replacement of Circuit Boards**
Explains how to replace the circuit boards.

**Section 6 General Information for Electrical Alignment**
Explains the general information for electrical adjustments.

**Section 7 VTR System Alignment**
Explains the electrical adjustments for VTR.

**Section 8 Camera System Alignment**
Explains the electrical adjustments for camera (DNW-7/7P/90/90P).

### Maintenance Manual Part 2 Volume 2

**Section 1 Spare Parts**
**Section 2 Semiconductor Pin Assignments**
**Section 3 Block Diagrams**
**Section 4 Board Layouts**
**Section 5 Schematic Diagrams**

## Relative manual

Besides this “Maintenance Manual Part 1”, the following manuals are available for this unit.

- **Operation Manual (Supplied with this unit.)**
  This manual is necessary for application and operation of this unit.

- **Maintenance Manual Part 2 (Not supplied with this unit.)**
  This manual describes the information items (adjustments, board layouts, schematic diagrams, detailed parts list, etc.) that premise the service based on parts.
  If this manual is required, please contact Sony’s service organization.

- **BVF-V10/V10CE or BVF-V20W/V20WCE**
  **Maintenance Manual (Not supplied with this unit.)**
  This manual describes the service information of the viewfinder.
  If this manual is required, please contact Sony’s service organization.

# Section 1
# Service Overview

## 1-1. Extension Boards

Extension boards are supplied as optional fixture for check and adjustment of the following boards.
For using of the extension boards, refer to the following sections of the Maintenance Manual Part 1.

- DNV-5 “1-15-1. Extension Boards”
- DNW-7/7P/90/90P/90WS/90WSP “1-14-1. Extension Boards”

Extension board assembly : EX-501, EX-541, EX-542, stays
Part No. : A-8312-804-A

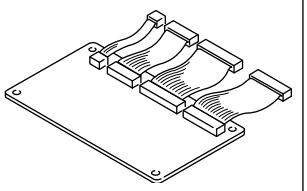
| Extension board | Assembly to be extend | Board to be checked and adjusted | DNV-5 | DNW-7/7P DNW-90/90P | DNW-90WS DNW-90WSP |
|---|---|---|---|---|---|
| EX-501 | DVP Assembly | DVP-1 | ○ | ○ | ○ |
| | | DVP-2 | ○ | ○ | ○ |
| | DCP Assembly | DCP-1 | | ○ | ○ |
| | | ES-11 | | ○ | ○ |
| | | CN-1193 | | ○ | |
| | | RC-61 | | | ○ |
| | IF Assembly | IF-634 | ○ | | |
| | | CT-187 | ○ | | |
| EX-542, EX-542 | – | MDC-5 | ○ | ○ | ○ |

# 1-2. Fixtures

| Fig. No. | Part No. | Description | For use |
|---|---|---|---|
| 1 | A-8312-292-A | TP Tool | Video tracking adjustment |
| 2 | A-8312-804-A | Extension Board Assembly (EX-501/541/542, Stays) | Plug-in board check/adjustment |
| 3 | J-6026-100-A | Resolution Chart (4:3) *1 | Camera adjustment |
| | J-6394-320-A | Resolution Chart (16:9) *2 | |
| | J-6026-110-A | Burst Chart *1 | |
| | J-6026-130-A | Gray Scale Chart (4:3) *1 | |
| 4 | J-6394-080-A | Gray Scale Chart (16:9) *2 | |
| 5 | J-6029-140-B | Pattern Box, PTB-500 *1 | |
| 6 | J-6035-070-A | IC External Tool (ICT-2101) | Extraction of IC (PLCC type) |
| 7 | J-6080-840-A | Inspection Mirror | Video tracking adjustment |
| 8 | J-6152-450-A | Wire Clearance Check Gauge | Clearance check |
| 9 | J-6322-420-A | Tape Guide Adjustment Driver (45) | Tape path adjustment |
| | J-6322-420-3 | TG Driver Spare Bit (45) | |
| 10 | J-6323-530-A | Stop Washer Fastening Tool | Installation of stop washer |
| 11 | J-6323-890-A | FWD Back Tension Measuring Cassette | FWD back tension adjustment |
| 12 | J-6324-150-A | Reel Table Height Adjustment Tool | Reel height adjustment |
| 13 | J-6325-110-A | Torque Driver Bit (for M1.4) | Tightening screws |
| | J-6325-380-A | Torque Driver Bit (for M2) | |
| 14 | J-6325-400-A | Torque Driver Bit (for 3 kg) | |
| 15 | J-6326-120-A | Hexagonal Bit | |
| 16 | J-7032-610-A | Cassette Reference Plate | Reel height adjustment |
| 17 | 3-184-527-01 | Cleaning Cloth | Cleaning |
| 18 | 3-703-358-08 | Parallel Pin | Mechanical adjustment |
| 19 | 7-651-000-10 | Grease, SGL-601 (50 g) | Lubricant |
| | 7-651-000-11 | Grease, SGL-801 (50 g) | |
| 20 | 7-661-018-18 | Oil | |
| 21 | 7-700-736-05 | Hexagonal Wrench (d = 1.5 mm) | Removal of screws |
| 22 | 8-960-075-01 | Alignment Tape, SR5-1 | Digital video/audio adjustment (NTSC) |
| | 8-960-075-11 | Alignment Tape, SR2-1 | Video tracking adjustment (NTSC) |
| | 8-960-075-51 | Alignment Tape, SR5-1P | Digital video/audio adjustment (PAL) |
| | 8-960-075-61 | Alignment Tape, SR2-1P | Video tracking adjustment (PAL) |
| 23 | 9-919-573-01 | Cleaning Fluid | TTP cleaning |
| – | 7-432-114-11 | Screw Locking Compound | |
| – | Product | Blank Tape, BCT-30MA or Betacam SX Tape, BCT-60SX | For recording |
| | | Cleaning Tape, BCT-5CLN | Cleaning |

*1 : For DNW-7/7P/90/90P/90WS/90WSP only
*2 : For DNW-90WS/90WSP only

1



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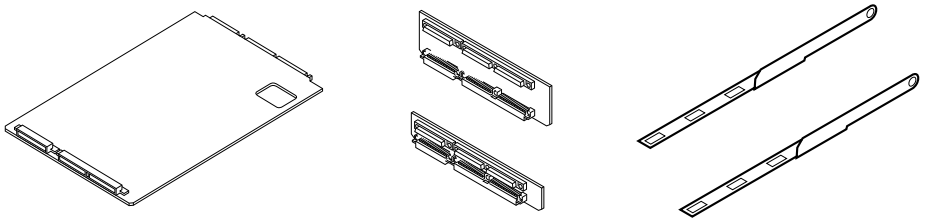

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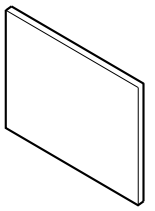

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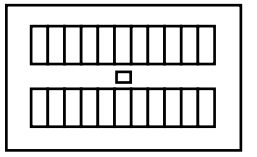

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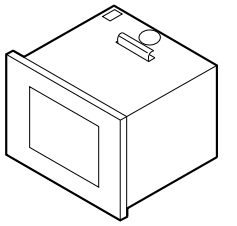

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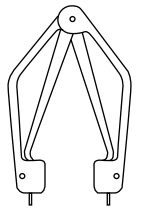

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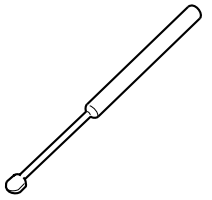

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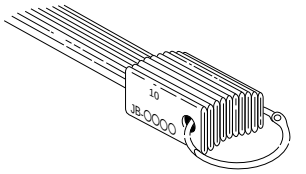

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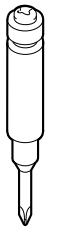

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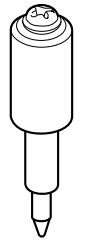

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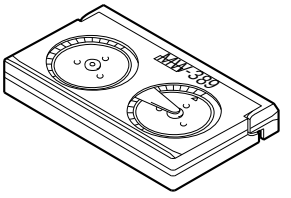


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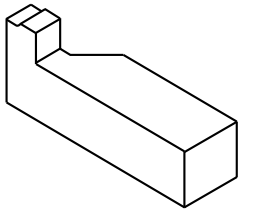

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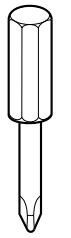

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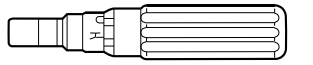

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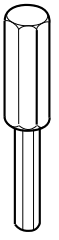

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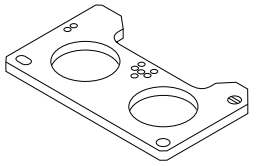

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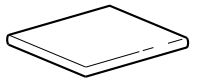

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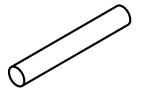
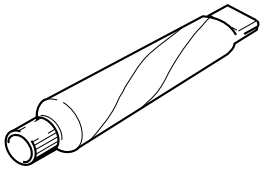
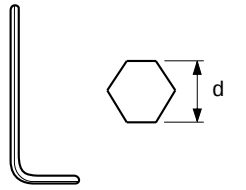


19

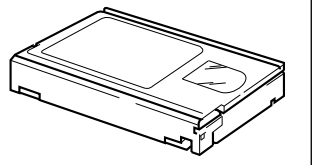


20

21




22



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## 1-3. Lithium Battery Replacement

The unit has a lithium battery on the TC-80 board. When replacing, desolder two terminals for the lithium battery. If the lithum battery runs down, the internal clock data (the time of day, the date) is cleared. The lithium battery running down, set up the unit again as necessary.

**CAUTION**

In replacing, ensure that the battery is installed with "+" and "−" poles connected to the correct terminals. An improper connection may cause an explosion or leakage of fluid.

http://getMANUAL.com

# Section 2
# Maintenance Mode

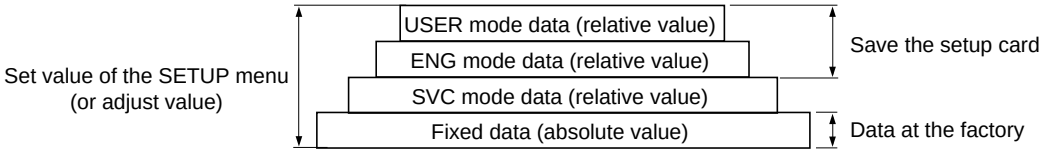
## 2-1. Setup Menu

This unit has the SETUP menu required for the settings and adjustments of the camera.
This section describes the SVC (SERVICE) mode.

### Data structure

The menu has the following data structure.
Set value of the data (or adjust value) = fixed data (absolute value) + set value of the SVC mode (relative value) + set value of the ENG mode (relative value) + set value of the USER mode (relative value)

- The fixed data is stored in IC74 (this IC is mounted in the IC socket (CNI1) on the DCP-1 board), and the set values of the USER, ENG and SVC modes are stored in IC152 (on the DCP-1 board).
- The set values of the USER, ENG and SVC modes are set to 0 when the unit is shipped from the factory. Execute the DATA RESET of each mode to return to the factory shipping data. (The adjustment is required.)


Set value of the SETUP menu
(or adjust value)
USER mode data (relative value)
ENG mode data (relative value)
SVC mode data (relative value)
Fixed data (absolute value)
Save the setup card
Data at the factory

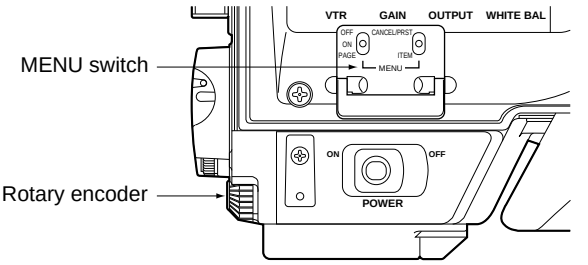
### 1. SVC mode

- The replacement boards for repair purpose supplied from the repair parts center is adjusted at the factory. However, due to the variability of respective products, perform the adjustment using the SVC mode after the board replacement, or when you require the fine-adjustment.
- When adjustment is performed using the SVC mode, the values of items adjusted in the ENG mode and the USER mode become 0.

### 2. Setup card

- The set values of the USER mode and ENG mode are stored separately in the setup card.
- The set value at the factory is stored as fixed data. This value may differ for each unit. The [fixed data + set value in SVC mode] in each state must be made the same when an identical setup card is used before and after board replacement or between different units.
  Using the reference unit it is recommended to store the set values of the USER mode and the ENG mode beforehand in the setup card. Then replace the board or use another unit, perform adjustment using the SVC mode, and download the stored data from the setup card.

### Switch description




**1. MENU switch**

OFF : Terminate the SETUP menu.
Usually, set to OFF.
ON : Execute the SETUP menu.
PAGE : Search page of the SETUP menu.
CANCEL/PRST: Cancel the setting value (during level control) or reset to the factory-setting value.
ITEM : Select item.

**2. Rotary encoder**

Rotary encoder uses to change the set value of selected item or to decide the changed setting value.

### Operation

The SETUP menu is set to the USER mode when shipped from the factory.
Perform the following procedures to enter the SVC mode.

1. Turn the main power off.
2. Set the switch S4-1 on the DCP-1 board to ON.
3. Turn the main power on.
4. Set the MENU switch to ON. The SETUP menu appears on the viewfinder screen.

Setting Change (MENU switch operation)

1. To select the page, throw the MENU switch to PAGE. The page will be shifted to the next page every time the switch is thrown to PAGE.
2. To select the item, throw the MENU switch to ITEM. The cursor pointing the item will be shifted to the next item every time the switch is thrown to ITEM. By pressing the rotary encorder, selected item is entered.
3. To change the setting value, turn the rotary encoder.
4. To exit from the SETUP menu, set the MENU switch to OFF.

Setting Change (Rotary encorder operation)

1. To select the page, turn the rotary encoder until the desired page is appeared and press it down.
2. To select the item, turn the rotary encoder until the cursor pointng the item is shifted to the desired item and press it down.
   (When pressing the rotary encoder down with the cursor pointing the title of item, the menu display will be returned to the state in procedure 1.)
3. To change the setting value, turn the rotary encoder.
4. When pressing the rotary encoder down again, the menu display will be returned to the state in procedure 2
5. To exit from the SETUP menu, set the MENU switch to OFF.

**Note**

When the unit is externally controlled by the remote control unit RM-P9, some functions cannot be controlled. (Refer to pages 2-20 to 2-27.)

Pages configuration of the SETUP menu

| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| *** MARKER 1/2 *** | | |
| SAFETY ZONE | : ON | ..... Sets the safety zone marker display to ON or OFF. |
| SAFETY AREA | : 90 % | ..... Sets the safety zone area to 80 %, 90 % or 100 %. |
| CENTER | : ON | ..... Sets the center marker display to ON to OFF. |
| CENTER H | | ..... Moves the center marker horizontally. |
| CENTER V | | ..... Moves the center marker vertically. |
| *** MARKER 2/2 *** | | |
| BOX CURSOR | : OFF | ..... Sets the box cursor display to ON or OFF. *1 |
| BOX WIDTH | | ..... Changes the width of the box cursor. |
| BOX HEIGHT | | ..... Changes the height of the box cursor. |
| BOX H | | ..... Moves the box cursor horizontally. |
| BOX V | | ..... Moves the box cursor vertically. |
| ** VF DISPLAY 1/2 ** | | |
| DISP MODE | : 3 | ..... Set whether to display the items partially or to display no item. (1/2/3) |
| | | ..... For details, refer to the Operation Manual. |
| EXTENDER | : ON | ..... Sets the extender display to ON or OFF. |
| ZOOM | : ON | ..... Sets the zoom position display to ON or OFF. |
| ** VF DISPLAY 2/2 ** | | |
| FILTER | : ON | ..... Sets the filter display to ON or OFF. |
| WHITE | : ON | ..... Sets the white balance display to ON or OFF. |
| GAIN | : ON | ..... Sets the gain selection value display to ON or OFF. |
| SHUTTER | : ON | ..... Sets the shutter speed/mode display to ON or OFF. |
| TAPE | : ON | ..... Sets the tape remaining display to ON or OFF. |
| AUDIO | : ON | ..... Sets the CH-1 audio level display to ON or OFF. |
| IRIS | : ON | ..... Sets the iris value display to ON or OFF. |
| *** MASTER GAIN *** | | Sets the gain corresponding to the LOW, MIDDLE, HIGH and TURBO positions of the gain selector switch. |
| LOW | : 0 dB | Selects a GAIN value from -3, 0, 3, 6, 9, 12, 18, 24, or 30 dB . |
| MID | : 9 dB | Selects a TURBO value from -3, 0, 3, 6, 9, 12, 18, 24, 30, or 36 dB. |
| HIGH | : 18 dB | **Note** |
| TURBO | : 36 dB | When the gain selection value is changed, the BLACK SET adjustment (Section 8-13) is required. |
| *** SHOT ID *** | | Sets the shot ID of a maximum of twelve characters using alphanumeric character, symbol, and space. |
| ID-1 | : □□□□□□□□□□□□ | |
| ID-2 | : □□□□□□□□□□□□ | |
| ID-3 | : □□□□□□□□□□□□ | |
| ID-4 | : □□□□□□□□□□□□ | |

*1 : The box cursor is not functioned in the following conditions (DNW-90WS/90WSP only).
1. Set the “BOX/4:3 LIMITS” to 4:3 at WIDE SCREEN page.
2. Set the “BOX/4:3 LIMITS” to 4:3, and “VF ASPECT” to 16:9A or 16:9B at WIDE SCREEN page.

| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| * SHOT DATA DISP. * | | Sets the contents of the shot data to be recorded on tape |
| DATE | : OFF | ..... Sets whether to display/record the date. (ON/OFF only) |
| TIME | : OFF | ..... Sets whether to display/record the time. (ON/OFF only) |
| MODEL NAME | : OFF | ..... Sets whether to display/record the model name (ON/OFF only) |
| SERIAL NO. | : OFF | ..... Sets whether to display/record the serial No. (ON/OFF only) |
| CASSETTE NO. | : OFF | ..... Sets whether to display/record the cassette No.. (ON/OFF only) |
| SHOT NO. | : OFF | ..... Sets whether to display/record the shot No.. (ON/OFF only) |
| ID SELECT | : OFF | ..... Sets whether the any specific shot ID displays/records. (OFF/ID1/ID2/ID3/ID4) |
| *** SHUTTER SPEED *** | | Sets the shutter speed/mode selection range. |
| EVS | : ON | ..... Enhanced Vertical Definition mode (DNW-7 only)<br>Super Enhanced Vertical Definition mode (DNW-90/90WS only) |
| CLS | : ON | ..... CLS : Clear scan mode<br>ECS : Extended clear scan mode (DNW-90/90WS only) |
| 1/100 (for NTSC) or 1/60 (for PAL) | : ON | ..... Shutter speed 1/100 (for NTSC) or 1/60 (for PAL) second in the standard mode |
| 1/125 | : ON | ..... Shutter speed 1/125 second in the standard mode |
| 1/250 | : ON | ..... Shutter speed 1/250 second in the standard mode |
| 1/500 | : ON | ..... Shutter speed 1/500 second in the standard mode |
| 1/1000 | : ON | ..... Shutter speed 1/1000 second in the standard mode |
| 1/2000 | : ON | ..... Shutter speed 1/2000 second in the standard mode |
| *** ! LED *** | | |
| MASTER GAIN | : ON | ..... Sets whether to light the ! indicator LED on the viewfinder when the gain is set except 0 dB. |
| SHUTTER | : ON | ..... Sets whether to light the ! indicator LED on the viewfinder when the SHUTTER selector switch is set to ON. |
| WHITE PRESET | : OFF | ..... Sets whether to light the ! indicator LED on the viewfinder when the white balance memory is set to PRESET. |
| ATW RUN | : OFF | ..... Sets whether to light the ! indicator LED on the viewfinder when the ATW (automatic homing white balance) is operating. |
| EXTENDER ON | : ON | ..... Sets whether to light the ! indicator LED on the viewfinder when the lens extender is used. |
| FILTER 2,3,4 | : OFF | ..... Sets whether to light the ! indicator LED on the viewfinder when the FILTER selector is set except 1. (Standard setting is 1.) |
| A. IRIS OVERRIDE | : OFF | ..... Sets whether to light the ! indicator LED on the viewfinder when the reference value of the automatic iris adjustment is set to any value other than the standard value. |
| *** SETUP CARD *** | | |
| READ (→ CAM) | | ..... Reads data from the setup card. |
| WRITE (→ CARD) | | ..... Writes data to the setup card. |
| ID EDIT | | ..... Sets ID of the setup card. |
| WRITE PROTECT | | ..... Sets the WRITE PROTECT function of the setup card . (ENG mode only) |

| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| ** FUNCTION 1/2 ** | | |
| TEST OUT | : ENC | ..... Selects the ENC, R, G or B signal of the video signal output from the TEST OUT connector.<br>**Note**<br>When the R-G/B-G SEL item on the OP MODE page is set to ON, the R-G and B-G items are added enabling to select R-G and B-G. |
| DETAIL | : ON | ..... Sets whether to add the detail signal for resolution improvement to the video signal.<br>**Note**<br>The level adjustment for this item is performed on the “LEVEL 1” page. |
| APERTURE | : ON | ..... Sets the aperture correction to ON or OFF. |
| SKIN TONE DTL | : OFF | ..... Sets whether to activate the skin tone detail circuit.<br>**Note**<br>The level adjustment for this item is performed on the “LEVEL 2” page. |
| MATRIX | : OFF (for NTSC)<br>: ON (for PAL) | ..... Sets whether to activate the linear matrix circuit.<br>The highly color saturation can be obtained when this item is set to ON.<br>**Note**<br>The level adjustment for this item is performed on the “LEVEL 8” page. |
| GAMMA | : ON | ..... Sets whether to implement the gamma correction so that the overall characteristic of signals from the camera to monitor display is “GAMMA = 1”.<br>**Note**<br>The level adjustment for this item is performed on the “LEVEL 3” and “LEVEL 6” pages. |
| CHROMA | : ON | ..... Sets whether to add the chroma signal.<br>**Note**<br>The level adjustment for this item is performed on the “LEVEL 4” page. |
| TEST SAW | : OFF | ..... Sets whether to close the lens forcibly and add the TEST SAW waveform to the video signal circuit.<br>This signal is used for the video signal system adjustment. |
| CROSS COLOR FLT (for NTSC only) | : OFF | ..... Sets whether to reduce the cross color of a video signal. The cross color is reduced when this item is set to ON. |

| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| ** FUNCTION 2/2 ** | | |
| GENLOCK | : ON | ..... Sets whether to synchronize the internal reference signal with the external input video signal supplied to the GENLOCK IN connector. |
| CAM RET. | : OFF | ..... Sets whether to display the return video signal input to the GENLOCK IN connector on the viewfinder screen when the RET button is pressed ON. |
| FILTER INH. | : OFF | ..... Sets whether to interlock the white balance correction value to the filter position.<br>ON : The white balance correction value is not interlocked to the color temperature conversion filters ; The memory A and the memory B store one adjustment value respectively.<br>OFF : The white balance correction values for the respective color temperature conversion filters are stored in the memories A and B.<br>Four for memory A and four for memory B, total eight values can be stored. |
| FIELD/FRAME | : FLD | ..... Sets the type of the CCD data read-out system.<br>FLD : Field read mode. Normally set to this position.<br>FRM : Frame read mode. This position is selected when improved vertical resolution is desired.<br>**Note**<br>The frame read mode has more image lag than the field read mode. |
| A. IRIS OVERRIDE | : OFF | ..... Sets whether to activate the auto iris override function.<br>When this item is set to ON, the reference value of the auto iris adjustment can be changed using the rotary encoder when menu is set to OFF.<br>(Five steps : Irises off –1/2, –1/4, 0, +1/4, and +1/2) |
| DYNALATITUDE | : OFF | ..... Sets whether to active the dynalatude function.<br>Detects a high contrast signal that white and/or black level becomes flat, and correct to the suitable contrast. (Four steps : OFF, LOW, MID and HI) |
| * WIDE SCREEN * | | (DNW-90WS/90WSP only) |
| 16:9/4:3 MODE | : 16:9 | ..... Sets the aspect ratio of the video signal output from the VIDEO OUT and TEST OUT connectors. |
| VF ASPECT | : AUTO | ..... Sets the aspect ratio on the viewfinder.<br>AUTO : Sets the aspect ratio set by 16:9/4:3 MODE setting.<br>4:3 : Sets the aspect ratio to 4:3 regardless of 16:9/4:3 MODE setting.<br>16:9A : Sets the aspect ratio to 16:9 regardless of 16:9/4:3 MODE setting (displays the erea of 4:3 mode with the marker).<br>16:9B : Sets the aspect ratio to 16:9 regardless of 16:9/4:3 MODE setting (video level is cut in half out of the safety zone area on the VF screen). |
| BOX/4:3 LIMITS | : BOX | ..... Sets the function of the box cursor.<br>BOX : Operates as the normal cursor function.<br>4:3 : Displays the erea of 4:3 mode when the 16:9/4:3 MODE set to 16:9. |
| “16:9” BARS ID | : OFF | ..... Sets whether to add the “16:9” character in the color bars signal genarated in this unit when the 16:9/4:3 MODE set to 16:9. |
| “16:9” VF ID | : OFF | ..... Sets whether to add the “16:9” character on the VF screen when the 16:9/4:3 MODE set to 16:9. |

| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| ** VF SETTING ** | | |
| ZEBRA 1 DETECT | : 0 | ..... Sets the center level of the zebra 1 pattern. |
| ZEBRA 1 APT | : 0 | ..... Sets the width of the zebra 1 pattern. |
| ZEBRA 2 DETECT | : 0 | ..... Sets the lower-limit level of the zebra 2 pattern. The upper-limit level is the white clip level. |
| ZEBRA SELECT | : 1 | ..... Sets the zebra patterns ZEBRA1/ZEBRA2/both.<br>**Note**<br>The zebra detection level can be measured on waveform monitor when the TEST OUT is set to any position other than ENC and the zebra switch on VF is set to ON. |
| VF VDTL LEVEL | : 0 | ..... Set the level of the V detail signal of the video outputting to the viewfinder. |
| * LEVEL 1 * | | |
| DETAIL LEVEL | : 0 | ..... Sets the total level of the detail signal. |
| V DTL LEVEL | : 0 | ..... Sets the level of the V detail. The H/V ratio is adjusted using this item. |
| APERTURE LEVEL | : 0 | ..... Sets the high-frequency correction level. |
| KNEE APERTURE | : 0 | ..... Sets the detail level after the gamma correction. |
| V DTL BLK CLIP | : 0 | ..... Sets the clipping level in the negative (–) direction of the V detail. |
| DTL BLK CLIP | : 0 | ..... Sets the clipping level in the negative (–) direction of the H detail. |
| LEVEL DEPEND. | : MIN | ..... Sets the level of the skin tone detail amount in the low level. |
| CRISPENING | : 4 | ..... Sets the crispening level of the detail signal. |
| H DTL FREQ. | : 4 | ..... Sets frequency (amount) of the H detail. |
| * LEVEL 2 * | | |
| SUPPRESS LEVEL | : MIN | |
| X | : 0 | ..... Sets the skin tone detail range and amount.<br>X : Component of red<br>Y : Component of blue |
| Y | : 0 | |
| dX | : 0 | |
| dY | : 0 | |
| SKIN TONE DTL | : OFF | ..... Sets whether to activate the skin tone detail function.<br>**Note**<br>This item is the same as the “SKIN TONE DTL” item on the “FUNCTION 1/2” page. |
| SKIN TONE IND. | : OFF | ..... Sets whether to display the skin tone detection area.<br>Disable this item during the color bars output.<br>The indicator is automatically set to OFF when the power switch to OFF. Sets this item to OFF when the ZEBRA SELECT set to 2. |
| SKIN TONE DET. | : OFF | ..... Set the skin tone automatic detection. |

| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| * LEVEL 3 * | | |
| MASTER BLACK | : 0 | .....Sets the black level. |
| MASTER GAMMA | : 0 | .....Sets the gamma correction curve. |
| KNEE POINT 1 | : 0 | .....Used for the manual knee adjustment. Sets the knee point and slope. |
| KNEE SLOPE 1 | : 0 | |
| KNEE POINT 2 | : 0 | .....Used for the manual knee adjustment. Sets the knee point and slope. |
| KNEE SLOPE 2 | : 0 | |
| KNEE SELECT | : 1 | .....Sets the knee patterns KNEE1/KNEE2/OFF. The knee correction is forcibly canceled regardless of DCC ON/OFF setting when this item is set to OFF.<br>Set the knee correction set by KNEE POINT 1/KNEE SLOPE 1 setting when this item is set to 1. |
| WHITE CLIP | : ON | .....The white clip is forcibly canceled when this item is set to OFF.<br>Used for the video system adjustment. |
| WHT CLIP LEV. | : 0 | .....Sets the white clip level. |
| * LEVEL 4 * | | |
| BURST LEVEL | : 0 | .....Used for the chroma adjustment of the encoder. |
| BURST PHASE | : 0 | .....Used for the chroma adjustment of the encoder. (for PAL only) |
| R-Y | : ON | .....Sets whether to add the R-Y signal to the encoder circuit. |
| B-Y | : ON | .....Sets whether to add the signal to the encoder circuit. |
| R-Y LEVEL | : 0 | .....Used for the R-Y adjustment of the encoder. ∗1 |
| B-Y LEVEL | : 0 | .....Used for the B-Y adjustment of the encoder. ∗1<br>**Note**<br>The setting of the “CHROMA” item on the “FUNCTION 1/2” page has priority over the ON/OFF setting of the “R-Y” and “B-Y” items. When the CHROMA is set to ON, it automatically returns to ON by turning the power switch to ON/OFF even if the R-Y or B-Y item is to OFF. This item does not returns to ON when the “CHROMA” item is set to OFF. |
| * LEVEL 5 * | | |
| RGB LEVEL | : 0 | .....Sets the R/G/B video level. ∗1 |
| RGB SYNC LEV. | : 0 | .....Sets the R/G/B sync level. |
| RGB SETUP LEV. | : 0 | .....Sets the R/G/B setup level. |
| ENC Y LEVEL | : 0 | .....Sets the encoder output Y level. ∗1 |
| ENC SYNC LEV. | : 0 | .....Sets the encoder output sync level. |
| ENC SETUP LEV. | : 0 | .....Sets the encoder output setup level. |

∗1: This level can be set in the 4:3/16:9 mode separately using DNW-90WS/90WSP.

| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| * LEVEL 6 * | | |
| R BLACK | : 0 | ..... Sets the R/G/B black level. |
| G BLACK | : 0 | |
| B BLACK | : 0 | |
| R GAMMA | : 0 | ..... Sets the R/G/B gamma correction curve. |
| G GAMMA | : 0 | |
| B GAMMA | : 0 | |
| BLACK STRETCH | : 2 | ..... Stretch or compress the black gain. |
| TEST OUT | : ENC | ..... Sets the type of the video signal output from the TEST OUT connector.<br>**Note**<br>Same as TEST OUT item of the “FUNCTION 1/2” page. |
| * LEVEL 7 * | | |
| R FLARE | : 0 | ..... Sets the R/G/B flare correction amount. |
| G FLARE | : 0 | |
| B FLARE | : 0 | |
| FLARE | : ON | ..... Sets whether to activate the flare correction function. |
| TEST OUT | : ENC | ..... Sets the type of the video signal output from the TEST OUT connector.<br>**Note**<br>Same as TEST OUT item of the “FUNCTION 1/2” page. |
| * LEVEL 8 * | | |
| MATRIX TABLE | : A | ..... Selects the matrix setting.<br>When shipped from the factory, the same matrix is assigned for both A and B.<br>The matrix coefficient can be freely changed to obtain a customers’ desired color reproducibility. |
| | : B (for PAL) | |
| R-G | : 0 | ..... Sets the matrix coefficient. |
| R-B | : 0 | |
| G-R | : 0 | |
| G-B | : 0 | |
| B-R | : 0 | |
| B-G | : 0 | |
| MATRIX | : OFF | ..... Sets whether to activate the linear matrix circuit.<br>**Note**<br>Same as MATRIX item of the “FUNCTION 1/2” page. |
| | : ON (for PAL ) | |

| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| * LEVEL 9 * | | |
| H PHASE | : –37 (PAL : –32) | ..... Sets the H phase of the camera in the external genlock mode. |
| SC PHASE | : 0 | ..... Sets the SC phase of the camera in the external genlock mode. |
| SC 0/180 SELECT | : 0 | ..... Inverts the SC phase of the camera in the external genlock mode. (Selects either 0 or 180 degrees.) |
| SC-H | : 0 | ..... Sets the INT SC phase reference level. |
| IRIS SET | : 0 | ..... Sets the auto iris reference level. |
| IRIS MODE | : 0 | ..... Sets the auto iris control level. |
| | | ..... The more this set value increase, it approaches the average. The less this set value decreases, it approaches the peak. Monitor the level bar at the upper right on the viewfinder screen for this setting item to check that it approaches the peak level or average level. The “P” indication on the left of the level bar means the peak level. The “A” indication on the right of the level bar means the average level. |
| IRIS WEIGHT | : 0 | ..... Sets the valid range of the auto iris. (The larger number make the valid range narrower.) |
| IRIS SPEED | : 0 | ..... Sets the auto iris response speed. |
| CLIP HIGH LIGHT | : OFF | ..... Limits the auto iris detection to 100% for the subject of high brightness (video level: 100% or more) |
| * W-SHAD._G * | | |
| H SAW | : 0 | ..... Sets the manual white shading correction amount of G signal. |
| H PARA | : 0 | |
| V SAW | : 0 | |
| V PARA | : 0 | |
| H SAW (EXT) | : 0 | ..... Sets the manual white shading correction amount of G signal during the extender mode. |
| H PARA (EXT) | : 0 | |
| V SAW (EXT) | : 0 | |
| V PARA (EXT) | : 0 | |
| SHAD COMP | : ON | ..... Sets whether to activate the shading correction on G signal. |
| TEST OUT | : ENC | ..... Sets the type of the video signal output from the TEST OUT connector.<br>**Note**<br>Same as TEST OUT item of the “FUNCTION 1/2” page. |

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| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| * W-SHAD._R * | | |
| H SAW | : 0 | |
| H PARA | : 0 | |
| V SAW | : 0 | ..... Sets the manual white shading correction amount of R signal. |
| V PARA | : 0 | |
| H SAW (EXT) | : 0 | |
| H PARA (EXT) | : 0 | |
| V SAW (EXT) | : 0 | ..... Sets the manual white shading correction amount of R signal during the extender mode. |
| V PARA (EXT) | : 0 | |
| SHAD COMP | : ON | ..... Sets whether to activate the shading correction on R signal. |
| TEST OUT | : ENC | ..... Sets the type of the video signal output from the TEST OUT connector.<br>**Note**<br>Same as TEST OUT item of the “FUNCTION 1/2” page. |
| * W-SHAD._B * | | |
| H SAW | : 0 | |
| H PARA | : 0 | |
| V SAW | : 0 | ..... Sets the manual white shading correction amount of B signal. |
| V PARA | : 0 | |
| H SAW (EXT) | : 0 | |
| H PARA (EXT) | : 0 | |
| V SAW (EXT) | : 0 | ..... Sets the manual white shading correction amount of B signal during the extender mode. |
| V PARA (EXT) | : 0 | |
| SHAD COMP | : ON | ..... Sets whether to activate the shading correction on B signal. |
| TEST OUT | : ENC | ..... Sets the type of the video signal output from the TEST OUT connector.<br>**Note**<br>Same as TEST OUT item of the “FUNCTION 1/2” page. |
| * B-SHAD._G * | | |
| H SAW | : 0 | |
| H PARA | : 0 | |
| V SAW | : 0 | ..... Sets the manual black shading correction amount of G signal. |
| V PARA | : 0 | |
| SHAD COMP | : ON | ..... Sets whether to activate the shading correction on G signal. |
| TEST OUT | : ENC | ..... Sets the type of the video signal output from the TEST OUT connector.<br>**Note**<br>Same as TEST OUT item of the “FUNCTION 1/2” page. |

| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| * B-SHAD._R * | | |
| H SAW | : 0 | |
| H PARA | : 0 | |
| V SAW | : 0 | ..... Sets the manual black shading correction amount of R signal. |
| V PARA | : 0 | |
| SHAD COMP | : ON | ..... Sets whether to activate the shading correction on R signal. |
| TEST OUT | : ENC | ..... Sets the type of the video signal output from the TEST OUT connector. |
| | | **Note** |
| | | Same as TEST OUT item of the “FUNCTION 1/2” page. |
| * B-SHAD._B * | | |
| H SAW | : 0 | |
| H PARA | : 0 | |
| V SAW | : 0 | ..... Sets the manual black shading correction amount of B signal. |
| V PARA | : 0 | |
| SHAD | : ON | ..... Sets whether to activate the shading correction on B signal. |
| TEST OUT | : ENC | ..... Sets the type of the video signal output from the TEST OUT connector. |
| | | **Note** |
| | | Same as TEST OUT item of the “FUNCTION 1/2” page. |
| * DCC ADJ. * | | |
| D RANGE | : 6 | ..... Sets the dynamic range during dynamic contrast control. |
| | | (0 : approximately 300 %, 6 : approximately 600 %) |
| POINT | : 0 | ..... Sets the minimum knee point during dynamic contrast control. |
| GAIN | : 0 | ..... Sets the knee slope value during dynamic contrast control. |

| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| * OPERATION MODE 1 * | | |
| R-G/B-G SEL. | : OFF | ..... Sets whether to add the R-G and B-G signals to the TEST OUT setting of the setup menu. |
| GAMMA TABLE | : A (PAL : B) | ..... Selects the characteristics of the gamma correction.<br>More distinct black gradation is obtained when this item is set to B.<br>Normally setting to A.<br>A : Sony standard gamma curve<br>B : High gain gamma curve |
| LOW LIGHT | : OFF | ..... Sets the starting level of the LOW LIGHT display on viewfinder.<br>OFF : No display<br>1 : Approx. 10 %<br>2 : Approx. 15 %<br>3 : Approx. 20 % |
| BARS SELECT | : 1 | ..... Sets the type of built-in color bars signal<br>1 : SMPTE color bars<br>2 : EBU color bars (PAL)/Full color bars (NTSC)<br>3 : SNG color bars |
| WHITE B | : AWB | ..... Sets the function of white balance (B-CH)<br>AWB : Auto white balance<br>ATW : Auto tracing white balance |
| BATT WARNING | : 10% | ..... Sets the blinking (alarm) starting level of the remaining amount of battery in ANTON BAUER Inc., battery.<br>10% : Starts blinking when the remaining amount of battery voltage reaches about 0.67 V.<br>20% : Starts showing the 20% display when the remaining amount of battery voltage reaches about 1.33 V, and starts blinking at about 1.0 V. |
| WIDE AWB | : ON | ..... Widens the adjustment range of auto white balance. |
| ZEBRA | : OFF | ..... Sets this item when a VF without the zebra switch is used.<br>A zebra pattern is forcibly displayed on the viewfinder screen regardless of the VF zebra switch setting when this item is set to ON. |
| * OPERATION MODE 2 * | | |
| TIME CODE DISP | : OFF | ..... Sets whether to output the time code to the TEST OUT connector and viewfinder screen.<br>VF : Outputs the time code to the viewfinder only.<br>TEST : Outputs the time code to the TEST OUT connector only.<br>BOTH : Outputs the time code to the viewfinder and TEST OUT connector.<br>OFF : Outputs no time code. |
| * SG ADJ. * | | |
| H BLKG WIDTH | : 0 | ..... Sets the H blanking width. |
| V BLKG | : 20 H | ..... Selects the V blanking width. (19 H, 20 H, or 21 H) (For NTSC only) |

| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| * ENC ADJ. * | | |
| BURST START | : 0 | .....Adjusts the burst start position. |
| BURST STOP | : 0 | .....Adjusts the burst end position. |
| R-Y CAR. BAL. | : 0 | .....Adjusts the carrier balance of encoder. |
| B-Y CAR. BAL. | : 0 | .....Adjusts the carrier balance of encoder. |
| SYNC START | : 0 | .....Adjusts the start position of the synchronizing signal. |
| SYNC STOP | : 0 | .....Adjusts the end position of the synchronizing signal. |
| INT FSC FREQ. | : 0 | .....Adjusts the fsc frequency. |
| * DATA RESET * | | Resets the set value or adjustment value in each mode. |
| USER | | .....Resets the data set in the USER mode. |
| ENGINEER | | .....Resets the data set in the USER and ENG modes. |
| SERVICE | | .....Resets the data set in the USER, ENG and SVC modes.<br>Reset the factory-setting value by SVC resetting.<br>**Note**<br>The adjustment data of the white balance and black balance are cleared in each reset mode. The TEST OUT output is set to ENC. The TEST SAW is canceled and the camera picture is output. |
| * MENU SELECT 1 * | | Sets whether to display the pages on the left in the USER mode. |
| MARKER 1/2 | : ON | |
| MARKER 2/2 | : OFF | |
| VF DISP. 1/2 | : ON | |
| VF DISP. 2/2 | : ON | |
| MASTER GAIN | : ON | |
| SHOT ID | : ON | |
| SHOT DATA DISP. | : ON | |
| SHUTTER SPEED | : OFF | |
| ! LED | : OFF | |
| SETUP CARD | : ON | |
| * MENU SELECT 2 * | | Sets whether to display the pages on the left in the USER mode. |
| VF SETTING | : OFF | |
| LEVEL -1 | : OFF | |
| LEVEL -2 | : OFF | |
| LEVEL -3 | : OFF | |
| LEVEL -4 | : OFF | |
| LEVEL -5 | : OFF | |
| LEVEL -6 | : OFF | |
| LEVEL -7 | : OFF | |
| LEVEL -8 | : OFF | |
| LEVEL -9 | : OFF | |

| Viewfinder screen (Factory default setting) | Description |
|---|---|
| * MENU SELECT 3 * | Sets whether to display the pages on the left in the USER mode. |
| W-SHAD._G : OFF | |
| W-SHAD._R : OFF | |
| W-SHAD._B : OFF | |
| B-SHAD._G : OFF | |
| B-SHAD._R : OFF | |
| B-SHAD._B : OFF | |
| FUNCTION 1/2 : OFF | |
| FUNCTION 2/2 : OFF | |
| WIDE SCREEN : ON | (DNW-90WS only) |
| * MENU SELECT 4 * | Sets whether to display the pages on the left in the USER mode. |
| DCC ADJUSTMENT : OFF | |
| OPERATION MODE 1 : OFF | |
| OPERATION MODE 2 : ON | |
| SG ADJUSTMENT : OFF | |
| ENC ADJUSTMENT : OFF | |
| DATA RESET : OFF | |
| * MEASUREMENT MODE * | Automatically makes various settings required to measure the following specifications (when this item is set to ON). |
| S/N : OFF | ..... S/N — DETAIL : OFF; APERTURE : OFF; CHROMA : OFF; GAMMA : OFF; MATRIX : OFF; FLARE : OFF |
| MODULATION : OFF | ..... MODULATION (modulation degree) — DETAIL : OFF; APERTURE : OFF; GAMMA : OFF; MATRIX : OFF; FLARE : OFF |
| RESOLUTION : OFF | ..... RESOLUTION — MATRIX : OFF |
| SENSITIVITY : OFF | ..... SENSITIVITY — KNEE : OFF; WHITE CLIP : OFF |
| REGISTRATION : OFF | ..... REGISTRATION — DETAIL : OFF; APERTURE : OFF |
| MASTER BLACK : 0 | ..... Adjusts master black. |
| TEST OUT : ENC | ..... Sets the type of the video signal output from the TEST OUT connector.<br>**Note**<br>Same as TEST OUT item of the FUNCTION 1/2 page. |

| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| * WHT PRESET * | | |
| R WHT PRESET | : 0 | ..... Used for the manual adjustment when the white balance memory is preset. |
| B WHT PRESET | : 0 | Sets the FILTER selector to 1 (3200 K), shoots the light source (pattern box) of the required color temperature, and sets the levels in channels R and B so that the white balance is adjusted. |
| * TG ADJ. * | | |
| BC COMP. ADJ. | : 0 | ..... F data (Never attempt any adjustment.) |
| BC COMP. | : ON | ..... F data (Never attempt any adjustment.) |
| FLD/FLM | : FLD | ..... Sets the CCD read system.<br>FLD : Field read mode. Usually, set to FLD.<br>FRM : Frame read mode. This position is selected when improved vertical resolution is desired.<br>**Note**<br>The frame read mode has more image lag than the field read mode.<br>This item is the same as the “FIELD/FRAME” item on the “FUNCTION 2/2” page. |
| TEST OUT | : ENC | ..... Sets the type of the video signal output from the TEST OUT connector.<br>This item is the same as the “TEST OUT” item on the “FUNCTION 1/2” page. |
| * VA ADJ.-1 * | | |
| R GAIN (TMP) | : 0 | ..... Sets the gain of the white balance amplifier temporarily. (For circuit operation check purpose during maintenance)<br>This value is automatically rewritten by adjusting the white balance, selecting the WHITE BAL (white balance memory) switch, changing the ND/CC filter setting. The gain of the white balance amplifier can be directly set by setting the R, G, and B values. However, are temporary values, and rewritten by adjusting and changing the setting as described above. |
| G GAIN (TMP) | : 0 | |
| B GAIN (TMP) | : 0 | |
| R MOD BAL. | : 0 | ..... Used for the modulator balance adjustment. (For circuit operation check purpose during maintenance)<br>The modulation balance is automatically adjusted by performing the modulator balance adjustment (Section 8-6). During manual adjustment, the manually adjusted value is written in EEPROM instead of the automatically detected value. |
| G MOD BAL. | : 0 | |
| B MOD BAL. | : 0 | |
| SAW/REC | : SAW | ..... Selects the waveform output when the “TEST SAW” item is set to ON.<br>SAW : Test sawtooth wave<br>REC : Rectangular wave |
| TEST LEVEL | : 0 | ..... Adjusts the gain of the test waveform.<br>The peak level is automatically adjusted so that the test sawtooth wave and rectangular wave are the same in a level. |
| TEST SAW | : OFF | ..... Closes the lens forcibly and sets whether to add the test sawtooth waveform to the video signal system. |

| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| * VA ADJ.-2 * | | |
| R PREKNEE | : 0 | |
| G PREKNEE | : 0 | ..... Adjusts the preknee value when the OUTPUT/DCC selector is set to DCC OFF. |
| B PREKNEE | : 0 | |
| R PREKNEE (DCC) | : 0 | |
| G PREKNEE (DCC) | : 0 | ..... Adjusts the preknee value when the OUTPUT/DCC selector is set to DCC ON.<br>The knee slope obtains a fixed slope (which is the same between R, G, and B) when the OUTPUT/DCC selector is set to DCC ON then back OFF.<br>Adjusts the value of preknee (DCC) to minimize carrier leak. |
| B PREKNEE (DCC) | : 0 | |
| TEST OUT | : ENC | ..... Sets the type of the video signal output from the TEST OUT connector.<br>**Note**<br>Same as TEST OUT item of the “FUNCTION 1/2” page. |
| TEST SAW | : OFF | ..... Sets whether to close the lens forcibly and add the TEST SAW waveform to the video signal circuit.<br>**Note**<br>This item is the same as the “TEST SAW” item on the “VA ADJ. 1/2” page. |
| * AD ADJ. * | | |
| R AD GAIN | : 0 | ..... Adjusts the gain of the video signal input to the AD converter.<br>**Note**<br>Never attempt to change the value except when the AD and/or VA board is replaced, because it was adjusted the factory. |
| G AD GAIN | : 0 | |
| B AD GAIN | : 0 | |
| AD CK PHASE | : xx ns | ..... Adjusts the Gch-clock phase of the AD converter.<br>**Note**<br>Never attempt to change the value except when the CCD block and/or CDP-1 board is replaced, because it was adjusted the factory. |
| R/B CK PHASE | : xx ns | ..... Adjusts the Rch- and Bch-clock phases of the AD converter.<br>**Note**<br>Never attempt to change the value except when the CCD block and/or DCP-1 board is replaced, because it was adjusted the factory. |

| Viewfinder screen (Factory default setting) | | Description |
|---|---|---|
| * DEVICE STATUS * | | Checks the communication function for each device. |
| I/O | | I/O check |
| TG | : OK | ..... IC20/DR-291 board |
| AIF | : OK | ..... IC101/AIF-8 board |
| TC1 | : OK | ..... IC901/SIF-8 board |
| TC2 | : OK | ..... IC901/TC-88 board |
| | | In case of “NG”, confirm that the cable is not disconnected between boards. |
| EEPROM | | EEPROM check |
| TG1 | : OK | ..... IC15/DR-291 board |
| TG2 | : OK | ..... IC16/DR-291 board |
| ES | : OK | ..... IC19/ES-11 board |
| DCP | : OK | ..... IC140/DCP-1 board |
| AIF | : OK | ..... IC102/AIF-8 board |
| | | In case of “NG”, confirm that the cable is not disconnected between boards. |
| | | If not, the EEPROM is considered to be defective. |
| DP | | LSI check |
| PP | : OK | ..... IC17/DCP-1 board |
| PR | : OK | ..... IC42/DCP-1 board |
| RC | : OK | ..... IC71/DCP-1 board |
| | | In case of “NG”, the LSI is considered to be defective. |
| * DP DIAG STATUS * | | Checks the pulse and connection for each device. |
| PULSE | | |
| PP | : OK | ..... Perform the DP (LSI check). Checks that basic pulses (HD and VD and so on) are normally input to each device. |
| | | In case of “NG”, the device is considered to be defective or disconnected. |
| PR | : OK | |
| RC | : OK | |
| PR → RC | | Checks the connection between PR (IC42 on the DCP-1 board) and RC (IC71 on the DCP-1 board). |
| Y | : OK | ..... Y signal |
| B-Y | : OK | ..... B-Y signal |
| R-Y | : OK | ..... R-Y signal |

### Setup menu check sheet

| | |
|---|---|
| <CANCEL> | Yes or No is displayed to indicate whether the value set by the UP/DOWN button can be canceled using the CANCEL/PRST switch. |
| <PRESET> | Yes or No is displayed to indicate whether the factory default value can be returned using the CANCEL/PRST switch. |
| <SETUP C> | Yes or No is displayed to indicate whether data can be written in the setup card. |
| <RM-P9> | M, P, or No is displayed to indicate whether this item can be operated when remote control unit RM-P9 is connected.<br>M (MENU) : Can be operated at the bottom of the RM-P9.<br>P (PANEL) : Can be operated in the front of the RM-P9.<br>No : Cannot be operated by the RM-P9. |
| <F-SET> | Sets the factory default value. |
| <C-SET> | Write the setting state of the customer. |

| PAGE | ITEM | CANCEL | PRESET | SETUP C | RM-P9 | F-SET | C-SET |
|---|---|---|---|---|---|---|---|
| MARKER 1/2 | SAFETY ZONE | NO | NO | YES | M | ON | |
| | SAFETY AREA | NO | NO | YES | M | 90% | |
| | CENTER | NO | NO | YES | M | ON | |
| | CENTER H | YES | YES | YES | M | | |
| | CENTER V | YES | YES | YES | M | | |
| MARKER 2/2 | BOX CURSOR | NO | NO | YES | M | OFF | |
| | BOX WIDTH | YES | YES | YES | M | | |
| | BOX HEIGHT | YES | YES | YES | M | | |
| | BOX H | YES | YES | YES | M | | |
| | BOX V | YES | YES | YES | M | | |
| VF DISPLAY 1/2 | DISP MODE | NO | NO | YES | M | 3 | |
| | EXTENDER | NO | NO | YES | M | ON | |
| | ZOOM | NO | NO | YES | M | ON | |
| VF DISPLAY 2/2 | FILTER | NO | NO | YES | M | ON | |
| | WHITE | NO | NO | YES | M | ON | |
| | GAIN | NO | NO | YES | M | ON | |
| | SHUTTER | NO | NO | YES | M | ON | |
| | TAPE | NO | NO | YES | M | ON | |
| | AUDIO | NO | NO | YES | M | ON | |
| | IRIS | NO | NO | YES | M | ON | |
| MASTER GAIN | LOW | NO | YES | YES | M | 0dB | |
| | MID | NO | YES | YES | M | 9dB | |
| | HIGH | NO | YES | YES | M | 18dB | |
| | TURBO | NO | YES | YES | M | 36dB | |
| SHOT ID | ID1 | YES | YES | YES | M | (Blank) | |
| | ID2 | YES | YES | NO | M | (Blank) | |
| | ID3 | YES | YES | NO | M | (Blank) | |
| | ID4 | YES | YES | NO | M | (Blank) | |
| SHOT DATA DISP. | DATE | NO | NO | YES | M | OFF | |
| | TIME | NO | NO | YES | M | OFF | |
| | MODEL NAME | NO | NO | YES | M | OFF | |
| | SERIAL NO. | NO | NO | YES | M | OFF | |
| | CASSTTE NO. | NO | NO | YES | M | OFF | |
| | SHOT NO. | NO | NO | YES | M | OFF | |
| | ID SELECT | NO | NO | YES | M | OFF | |
| SHUTTER SPEED | EVS | NO | NO | YES | P | ON | |
| | CLS | NO | NO | YES | P | ON | |
| | 1/100 (1/60) | NO | NO | YES | P | ON | |
| | 1/125 | NO | NO | YES | P | ON | |
| | 1/250 | NO | NO | YES | P | ON | |
| | 1/500 | NO | NO | YES | P | ON | |
| | 1/1000 | NO | NO | YES | P | ON | |
| | 1/2000 | NO | NO | YES | P | ON | |

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| PAGE | ITEM | CANCEL | PRESET | SETUP C | RM-P9 | F-SET | C-SET |
|---|---|---|---|---|---|---|---|
| ! LED | MASTER GAIN | NO | NO | YES | M | ON | |
| | SHUTTER | NO | NO | YES | M | ON | |
| | WHITE PRESET | NO | NO | YES | M | OFF | |
| | ATW | NO | NO | YES | M | OFF | |
| | EXTENDER ON | NO | NO | YES | M | ON | |
| | FILTER 2,3,4 | NO | NO | YES | M | OFF | |
| | A. IRIS OVERRIDE | NO | NO | YES | M | OFF | |
| SETUP CARD | READ (→ AM) | — | — | — | M | | |
| | WRITE (→ CARD) | — | — | — | M | | |
| | ID EDIT | — | — | — | M | | |
| | WRITE PROTECT | — | — | — | M | OFF | |
| FUNCTION 1/2 | TEST OUT | NO | YES | NO | M | ENC | |
| | DETAIL | NO | NO | YES | P | ON | |
| | APERTURE | NO | NO | YES | M | ON | |
| | SKIN TONE DTL | NO | NO | YES | M | OFF | |
| | MATRIX | NO | NO | YES | M | OFF(PAL:ON) | |
| | GAMMA | NO | NO | YES | M | ON | |
| | CHROMA | NO | NO | YES | M | ON | |
| | TEST SAW | NO | NO | YES | P | OFF | |
| | CROSS COLOR FLT | NO | NO | YES | M | OFF(NTSC only) | |
| FUNCTION 2/2 | GENLOCK | NO | NO | YES | M | ON | |
| | CAM RET. | NO | NO | YES | M | OFF | |
| | FILTER INH. | NO | NO | YES | NO | OFF | |
| | FIELD/FRAME | NO | NO | YES | M | FLD | |
| | A. IRIS OVERRIDE | NO | NO | YES | P | OFF | |
| | DYNALATITUDE | NO | NO | YES | M | OFF | |
| WIDE SCREEN | 16:9/4:3 MODE | NO | NO | YES | M | 16:9 | |
| | VF ASPECT | NO | NO | YES | M | AUTO | |
| | BOX/4:3 LIMITS | NO | NO | YES | M | BOX | |
| | "16:9" BARS ID | NO | NO | YES | M | OFF | |
| | "16:9" VF ID | NO | NO | YES | M | OFF | |
| VF SETTING | ZEBRA1 DETECT | YES | YES | YES | M | 0 | |
| | ZEBRA1 APT. | YES | YES | YES | M | 0 | |
| | ZEBRA2 DETECT | YES | YES | YES | M | 0 | |
| | ZEBRA SELECT | NO | NO | YES | M | 1 | |
| | VF VDTL LEVEL | NO | NO | YES | M | 0 | |

| PAGE | ITEM | CANCEL | PRESET | SETUP C | RM-P9 | F-SET | C-SET |
|---|---|---|---|---|---|---|---|
| LEVEL 1 | DETAIL LEVEL | YES | YES | YES | P | 0 | |
| | V DTL LEVEL | YES | YES | YES | M | 0 | |
| | APERTURE LEVEL | YES | YES | YES | M | 0 | |
| | KNEE APERTURE | YES | YES | YES | M | 0 | |
| | V DTL BLK CLIP | YES | YES | YES | M | 0 | |
| | DTL BLK CLIP | YES | YES | YES | M | 0 | |
| | LEVEL DEPEND | YES | YES | YES | M | MIN | |
| | CRISPENING | NO | NO | YES | M | 4 | |
| | DTL FREQ | NO | NO | YES | M | 4 | |
| LEVEL 2 | SUPPRESS LEVEL | YES | YES | YES | M | MIN | |
| | X | YES | YES | YES | M | 0 | |
| | Y | YES | YES | YES | M | 0 | |
| | dX | YES | YES | YES | M | 0 | |
| | dY | YES | YES | YES | M | 0 | |
| | SKIN TONE DTL | NO | NO | YES | M | OFF | |
| | SKIN TONE IND. | NO | NO | NO | M | OFF | |
| | SKIN TONE DET. | NO | NO | NO | M | OFF | |
| LEVEL 3 | MASTER BLACK | YES | YES | YES | P | MIN | |
| | MASTER GAMMA | YES | YES | YES | P | 0 | |
| | KNEE POINT 1 | YES | YES | YES | P | 0 | |
| | KNEE SLOPE 1 | YES | YES | YES | M | 0 | |
| | KNEE POINT 2 | YES | YES | YES | NO | 0 | |
| | KNEE SLOPE 2 | YES | YES | YES | NO | 0 | |
| | KNEE SELECT | NO | NO | YES | NO | 1 | |
| | WHITE CLIP | NO | NO | YES | M | ON | |
| | WHT CLIP LEV. | YES | YES | YES | M | 0 | |
| LEVEL 4 | BURST LEVEL | YES | YES | YES | M | 0 | |
| | BURST PHASE | YES | YES | YES | M | 0 (PAL only) | |
| | R-Y | NO | NO | NO | M | ON | |
| | B-Y | NO | NO | NO | M | ON | |
| | R-Y LEVEL | YES | YES | YES | M | 0 ※1 | |
| | B-Y LEVEL | YES | YES | YES | M | 0 ※1 | |
| | R-Y LEVEL | YES | YES | YES | M | 0 ※2 | |
| | B-Y LEVEL | YES | YES | YES | M | 0 ※2 | |
| LEVEL 5 | RGB LEVEL | YES | YES | YES | M | 0 ※1 | |
| | RGB SYNC LEV. | YES | YES | YES | M | 0 | |
| | RGB SETUP LEV. | YES | YES | YES | M | 0 | |
| | ENC Y LEVEL | YES | YES | YES | M | 0 ※1 | |
| | ENC SYNC LEV. | YES | YES | YES | M | 0 | |
| | ENC SETUP LEV. | YES | YES | YES | M | 0 | |
| | RGB LEVEL | YES | YES | YES | M | 0 ※2 | |
| | ENC Y LEVEL | YES | YES | YES | M | 0 ※2 | |

※1:DNW-7, DNW-90WS (4:3 mode) only
※2:DNW-90, DNW-90WS (16:9 mode) only

| PAGE | ITEM | CANCEL | PRESET | SETUP C | RM-P9 | F-SET | C-SET |
|---|---|---|---|---|---|---|---|
| LEVEL 6 | R BLACK | YES | YES | YES | P | 0 | |
| | G BLACK | YES | YES | YES | M | 0 | |
| | B BLACK | YES | YES | YES | P | 0 | |
| | R GAMMA | YES | YES | YES | M | 0 | |
| | G GAMMA | YES | YES | YES | M | 0 | |
| | B GAMMA | YES | YES | YES | M | 0 | |
| | BLACK STRETCH | NO | NO | YES | M | 2 | |
| | TEST OUT | NO | YES | NO | M | ENC | |
| LEVEL 7 | R FLARE | YES | YES | YES | M | 0 | |
| | G FLARE | YES | YES | YES | M | 0 | |
| | B FLARE | YES | YES | YES | M | 0 | |
| | FLARE | NO | NO | YES | M | ON | |
| | TEST OUT | NO | NO | NO | M | ENC | |
| LEVEL 8 | MATRIX TABLE | NO | NO | YES | M | A | |
| | R-G | YES | YES | YES | M | 0 | |
| | R-B | YES | YES | YES | M | 0 | |
| | G-R | YES | YES | YES | M | 0 | |
| | G-B | YES | YES | YES | M | 0 | |
| | B-R | YES | YES | YES | M | 0 | |
| | B-G | YES | YES | YES | M | 0 | |
| | MATRIX | YES | YES | YES | M | OFF(PAL:ON) | |
| LEVEL 9 | H PHASE | YES | YES | YES | M | –37 | |
| | SC PHASE | YES | YES | YES | M | 0 | |
| | SC 0/180 SELECT | NO | NO | YES | M | 0 | |
| | SC-H | YES | YES | YES | M | 0 | |
| | IRIS SET | YES | YES | YES | P | 0 | |
| | IRIS MODE | YES | YES | YES | M | 0 | |
| | IRIS WEIGHT | NO | NO | YES | M | 0 | |
| | IRIS SPEED | NO | NO | YES | M | 0 | |
| | CLIP HIGH LIGHT | NO | NO | YES | M | OFF | |
| W-SHAD._G | H SAW | YES | YES | YES | M | 0 | |
| | H PARA | YES | YES | YES | M | 0 | |
| | V SAW | YES | YES | YES | M | 0 | |
| | V PARA | YES | YES | YES | M | 0 | |
| | H SAW (EXT) | YES | YES | YES | M | 0 | |
| | H PARA (EXT) | YES | YES | YES | M | 0 | |
| | V SAW (EXT) | YES | YES | YES | M | 0 | |
| | V PARA (EXT) | YES | YES | YES | M | 0 | |
| | SHAD COMP. | NO | NO | YES | M | ON | |
| | TEST OUT | NO | YES | NO | M | ENC | |

| PAGE | ITEM | CANCEL | PRESET | SETUP C | RM-P9 | F-SET | C-SET |
|---|---|---|---|---|---|---|---|
| W-SHAD._R | H SAW | YES | YES | YES | M | 0 | |
| | H PARA | YES | YES | YES | M | 0 | |
| | V SAW | YES | YES | YES | M | 0 | |
| | V PARA | YES | YES | YES | M | 0 | |
| | H SAW (EXT) | YES | YES | YES | M | 0 | |
| | H PARA (EXT) | YES | YES | YES | M | 0 | |
| | V SAW (EXT) | YES | YES | YES | M | 0 | |
| | V PARA (EXT) | YES | YES | YES | M | 0 | |
| | SHAD COMP. | NO | NO | YES | M | ON | |
| | TEST OUT | NO | YES | NO | M | ENC | |
| W-SHAD._B | H SAW | YES | YES | YES | M | 0 | |
| | H PARA | YES | YES | YES | M | 0 | |
| | V SAW | YES | YES | YES | M | 0 | |
| | V PARA | YES | YES | YES | M | 0 | |
| | H SAW (EXT) | YES | YES | YES | M | 0 | |
| | H PARA (EXT) | YES | YES | YES | M | 0 | |
| | V SAW (EXT) | YES | YES | YES | M | 0 | |
| | V PARA (EXT) | YES | YES | YES | M | 0 | |
| | SHAD COMP. | NO | NO | YES | M | ON | |
| | TEST OUT | NO | YES | NO | M | ENC | |
| B-SHAD._G | H SAW | YES | YES | YES | M | 0 | |
| | H PARA | YES | YES | YES | M | 0 | |
| | V SAW | YES | YES | YES | M | 0 | |
| | V PARA | YES | YES | YES | M | 0 | |
| | SHAD COMP. | NO | NO | YES | M | ON | |
| | TEST OUT | NO | YES | NO | M | ENC | |
| B-SHAD._R | H SAW | YES | YES | YES | M | 0 | |
| | H PARA | YES | YES | YES | M | 0 | |
| | V SAW | YES | YES | YES | M | 0 | |
| | V PARA | YES | YES | YES | M | 0 | |
| | SHAD COMP. | NO | NO | YES | M | ON | |
| | TEST OUT | NO | YES | NO | M | ENC | |
| B-SHAD._B | H SAW | YES | YES | YES | M | 0 | |
| | H PARA | YES | YES | YES | M | 0 | |
| | V SAW | YES | YES | YES | M | 0 | |
| | V PARA | YES | YES | YES | M | 0 | |
| | SHAD COMP. | NO | NO | YES | M | ON | |
| | TEST OUT | NO | YES | NO | M | ENC | |
| DCC ADJ. | D RANGE | NO | NO | YES | M | 6 | |
| | POINT | YES | YES | YES | P | 0 | |
| | GAIN | YES | YES | YES | M | 0 | |

| PAGE | ITEM | CANCEL | PRESET | SETUP C | RM-P9 | F-SET | C-SET |
|---|---|---|---|---|---|---|---|
| OPERATION MODE 1 | R-G/B-G SEL | NO | NO | YES | M | OFF | |
| | GAMMA TABLE | NO | NO | YES | M | A | |
| | LOW LIGHT | NO | NO | YES | M | OFF | |
| | BARS SELECT | NO | NO | YES | M | 1(PAL:2) | |
| | WHITE B | NO | NO | YES | NO | AWB | |
| | BATT WARNING | NO | NO | YES | M | 10% | |
| | WIDE AWB | NO | NO | YES | M | ON | |
| | ZEBRA | NO | NO | YES | M | OFF | |
| OPERATION MODE 2 | TIME CODE DISP. | NO | NO | YES | M | OFF | |
| SG ADJ. | H BLKG WIDTH | YES | YES | YES | M | 0 | |
| | V BLKG | NO | NO | YES | M | 20H(NTSC only) | |
| ENC ADJ. | BURST START | YES | YES | YES | M | 0 | |
| | BURST STOP | YES | YES | YES | M | 0 | |
| | R-Y CAR. BAL. | YES | YES | YES | M | 0 | |
| | B-Y CAR. BAL. | YES | YES | YES | M | 0 | |
| | SYNC START | YES | YES | YES | M | 0 | |
| | SYNC STOP | YES | YES | YES | M | 0 | |
| | INT FSC FREQ. | YES | YES | YES | M | 0 | |
| DATA RESET | USER | — | — | — | NO | | |
| | ENGINEER | — | — | — | NO | | |
| | SERVICE | — | — | — | NO | | |
| MENU SELECT 1 | MARKER 1/2 | NO | NO | YES | M | ON | |
| | MARKER 2/2 | NO | NO | YES | M | OFF | |
| | VF DISP. 1/2 | NO | NO | YES | M | ON | |
| | VF DISP. 2/2 | NO | NO | YES | M | ON | |
| | MASTER GAIN | NO | NO | YES | M | ON | |
| | SHOT ID | NO | NO | YES | M | ON | |
| | SHOT DATA DISP. | NO | NO | YES | M | ON | |
| | SHUTTER SPEED | NO | NO | YES | M | OFF | |
| | ! LED | NO | NO | YES | M | OFF | |
| | SETUP CARD | NO | NO | YES | M | ON | |
| MENU SELECT 2 | VF SETTING | NO | NO | YES | M | OFF | |
| | LEVEL 1 | NO | NO | YES | M | OFF | |
| | LEVEL 2 | NO | NO | YES | M | OFF | |
| | LEVEL 3 | NO | NO | YES | M | OFF | |
| | LEVEL 4 | NO | NO | YES | M | OFF | |
| | LEVEL 5 | NO | NO | YES | M | OFF | |
| | LEVEL 6 | NO | NO | YES | M | OFF | |
| | LEVEL 7 | NO | NO | YES | M | OFF | |
| | LEVEL 8 | NO | NO | YES | M | OFF | |
| | LEVEL 9 | NO | NO | YES | M | OFF | |

| PAGE | ITEM | CANCEL | PRESET | SETUP C | RM-P9 | F-SET | C-SET |
|---|---|---|---|---|---|---|---|
| MENU SELECT 3 | W-SHAD._ G | NO | NO | YES | M | OFF | |
| | W-SHAD._ R | NO | NO | YES | M | OFF | |
| | W-SHAD._ B | NO | NO | YES | M | OFF | |
| | W-SHAD._ G | NO | NO | YES | M | OFF | |
| | W-SHAD._ R | NO | NO | YES | M | OFF | |
| | W-SHAD._ B | NO | NO | YES | M | OFF | |
| | FUNCTION 1/2 | NO | NO | YES | M | OFF | |
| | FUNCTION 2/2 | NO | NO | YES | M | OFF | |
| | WIDE SCREEN | NO | NO | YES | M | ON(DNW-90WS only) | |
| MENU SELECT 4 | DCC ADJ. | NO | NO | YES | M | OFF | |
| | OPERATION MODE 1 | NO | NO | YES | M | OFF | |
| | OPERATION MODE 2 | NO | NO | YES | M | ON | |
| | SG ADJ. | NO | NO | YES | M | OFF | |
| | ENC ADJ. | NO | NO | YES | M | OFF | |
| | DATA RESET | NO | NO | YES | M | OFF | |
| MEASUREMENT MODE | S/N | — | — | — | M | OFF | |
| | MODULATION | — | — | — | M | OFF | |
| | RESOLUTION | — | — | — | M | OFF | |
| | SENSITIVITY | — | — | — | M | OFF | |
| | REGISTRATION | — | — | — | M | OFF | |
| | MASTER BLACK | — | — | — | M | 0 | |
| | TEST OUT | NO | YES | NO | M | ENC | |
| WHT PRESET | R WHT PRESET | NO | NO | NO | M | 0 | |
| | B WHT PRESET | NO | NO | NO | M | 0 | |
| TG ADJ. | BC COMP. ADJ. | YES | YES | — | M | ON | |
| | BC COMP. | NO | NO | — | M | ON | |
| | FLD/FRM | NO | NO | — | M | FLD | |
| | TEST OUT | NO | YES | — | M | ENC | |
| VA ADJ.-1 | R GAIN (TMP) | YES | YES | — | NO | 0 | |
| | G GAIN (TMP) | YES | YES | — | NO | 0 | |
| | B GAIN (TMP) | YES | YES | — | NO | 0 | |
| | R MOD. BAL. | YES | YES | — | M | 0 | |
| | G MOD. BAL. | YES | YES | — | M | 0 | |
| | B MOD. BAL. | YES | YES | — | M | 0 | |
| | SAW/REC | NO | NO | — | M | SAW | |
| | TEST LEVEL | YES | YES | — | M | 0 | |
| | TEST SAW | NO | NO | — | P | OFF | |

| PAGE | ITEM | CANCEL | PRESET | SETUP C | RM-P9 | F-SET | C-SET |
|---|---|---|---|---|---|---|---|
| VA ADJ.-2 | R PREKNEE | YES | NO | — | M | 0 | |
| | G PREKNEE | YES | NO | — | M | 0 | |
| | B PREKNEE | YES | NO | — | M | 0 | |
| | R PREKNEE (DCC) | YES | NO | — | M | 0 | |
| | G PREKNEE (DCC) | YES | NO | — | M | 0 | |
| | B PREKNEE (DCC) | YES | NO | — | M | 0 | |
| | TEST OUT | NO | YES | — | M | ENC | |
| | TEST SAW | NO | NO | — | P | OFF | |
| AD ADJ. | R AD GAIN | YES | YES | — | M | 0 | |
| | G AD GAIN | YES | YES | — | M | 0 | |
| | B AD GAIN | YES | YES | — | M | 0 | |
| | AD CK PHASE | NO | NO | — | M | xx ns | |
| | R/B CK PHASE | NO | NO | — | M | xx ns | |
| DEVICE STATUS | I/O | | — | — | M | — | |
| | EEPROM | | — | — | M | — | |
| | DP | | — | — | M | — | |
| DP DIAG STATUS | PULSE | | — | — | M | — | |
| | PR → RC | | — | — | M | — | |

## 2-2. DIAG Menu

The DIAG menu is used for the maintenance menu setting and troubleshooting of the DNV-5.

**Notes**

- Use the DIAG menu in the state in which the tape transport stopped.
- Do not execute the DIAG menu when remote control RM-P9 is connected. The self-diagnosis function and remote control function are not normally activated when the self-diagnosis is executed.

### Operation

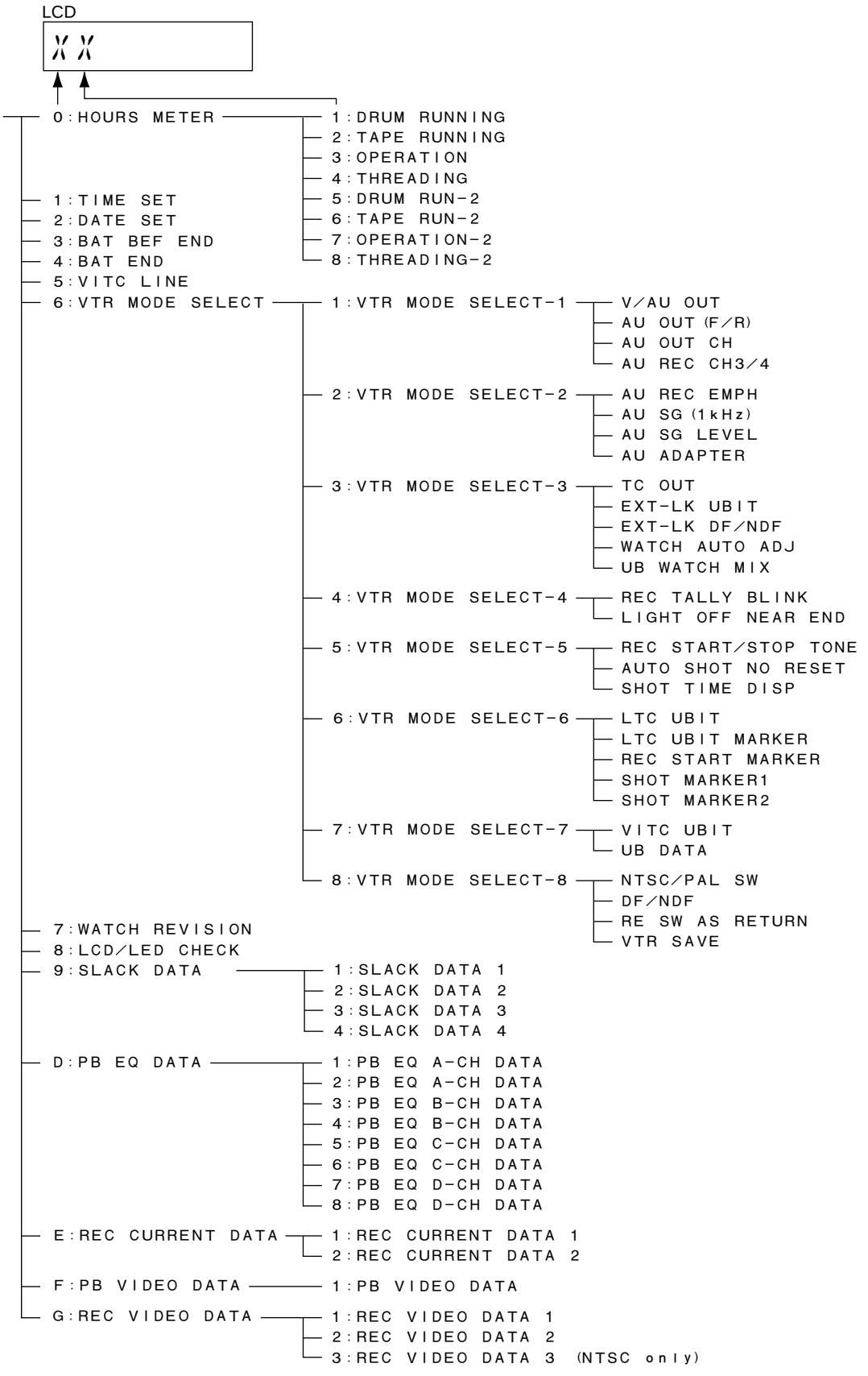
1. DIAG menu activation
   Push the DIAG switch on the inside panel with the tip of a clip so as to display the DIAG menu on the LCD display.

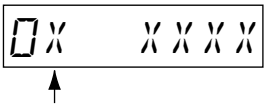
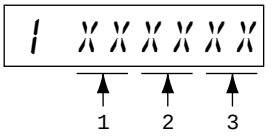
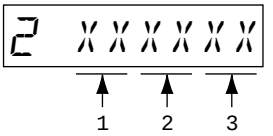
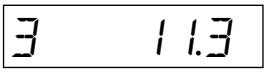
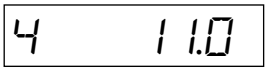
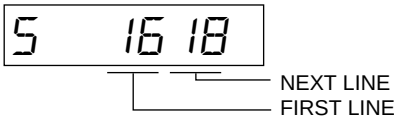
2. PAGE selection
   Press the ADVANCE button and select the PAGE.
   To increment the menu number, press the ADVANCE button.
   To decrement the menu number, press the ADVANCE and HOLD buttons simultaneously.
   After selection, Press the SHIFT button.
   Select the PAGE repeatedly until the desired ITEM is found.

3. ITEM selection
   Press the ADVANCE button and select the ITEM.
   After selection, press the SHIFT button.

4. ITEM setting
   Press the ADVANCE button to change the set value.
   After change, press the SHIFT button.

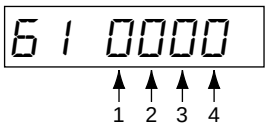
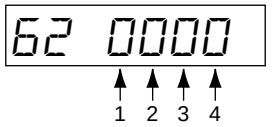
5. DIAG menu termination
   Press the DIAG switch.

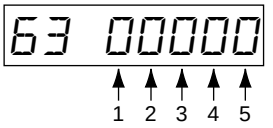
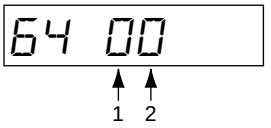
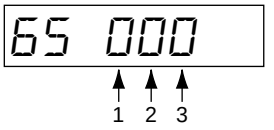

LCD
0:HOURS METER
1:DRUM RUNNING
2:TAPE RUNNING
3:OPERATION
4:THREADING
5:DRUM RUN-2
6:TAPE RUN-2
7:OPERATION-2
8:THREADING-2
1:TIME SET
2:DATE SET
3:BAT BEF END
4:BAT END
5:VITC LINE
6:VTR MODE SELECT
1:VTR MODE SELECT-1
V/AU OUT
AU OUT (F/R)
AU OUT CH
AU REC CH3/4
2:VTR MODE SELECT-2
AU REC EMPH
AU SG (1kHz)
AU SG LEVEL
AU ADAPTER
3:VTR MODE SELECT-3
TC OUT
EXT-LK UBIT
EXT-LK DF/NDF
WATCH AUTO ADJ
UB WATCH MIX
4:VTR MODE SELECT-4
REC TALLY BLINK
LIGHT OFF NEAR END
5:VTR MODE SELECT-5
REC START/STOP TONE
AUTO SHOT NO RESET
SHOT TIME DISP
6:VTR MODE SELECT-6
LTC UBIT
LTC UBIT MARKER
REC START MARKER
SHOT MARKER1
SHOT MARKER2
7:VTR MODE SELECT-7
VITC UBIT
UB DATA
8:VTR MODE SELECT-8
NTSC/PAL SW
DF/NDF
RE SW AS RETURN
VTR SAVE
7:WATCH REVISION
8:LCD/LED CHECK
9:SLACK DATA
1:SLACK DATA 1
2:SLACK DATA 2
3:SLACK DATA 3
4:SLACK DATA 4
D:PB EQ DATA
1:PB EQ A-CH DATA
2:PB EQ A-CH DATA
3:PB EQ B-CH DATA
4:PB EQ B-CH DATA
5:PB EQ C-CH DATA
6:PB EQ C-CH DATA
7:PB EQ D-CH DATA
8:PB EQ D-CH DATA
E:REC CURRENT DATA
1:REC CURRENT DATA 1
2:REC CURRENT DATA 2
F:PB VIDEO DATA
1:PB VIDEO DATA
G:REC VIDEO DATA
1:REC VIDEO DATA 1
2:REC VIDEO DATA 2
3:REC VIDEO DATA 3 (NTSC only)

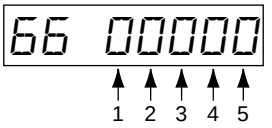
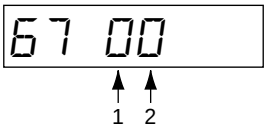
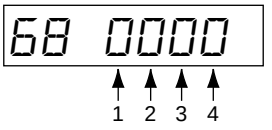
| LCD Display (factory setting) | Description |
|---|---|
| DIAG 0 | |
| HOURS METER<br>  | The contents below are displayed. (For more details, refer to 6-3-1, “Hours Meter”.) |
| 1. DRUM RUNNING | ..... Total drum rotating hours |
| 2. TAPE RUNNING | ..... Total tape running hours |
| 3. OPERATION | ..... Total power-on time |
| 4. THREADING | ..... Total number of threading |
| 5. DRUM RUN-2 | ..... Drum rotating hour (Customer-resetable) |
| 6. TAPE RUN-2 | ..... Tape running hour (Customer-resetable) |
| 7. OPERATION-2 | ..... Power-on time (Customer-resetable) |
| 8. THREADING-2 | ..... The number of threading (Customer-resetable) |
| DIAG 1 | |
| TIME<br>  <br> | Internal timer setting.<br>1. Sets the hour.<br>2. Sets the minute.<br>3. Sets the second. |
| DIAG 2 | |
| DATE<br>  <br> | Internal timer date setting.<br>1. Sets the month (for NTSC) /day (for PAL).<br>2. Sets the day (for NTSC) /month (for PAL).<br>3. Sets the year. |
| DIAG 3 | |
| BATTERY VOLTAGE<br>BEFORE END<br>  | Displays and sets the battery before end voltage.<br>(For the setting, refer to the Operation Manual.)<br>Battery before end voltage setting<br>11.0 to 13.0 V (in units of 0.1 V)<br>“0” is displayed on the LCD when the setting is OK.<br>“E” is displayed on the LCD when the setting is NG. |
| DIAG 4 | |
| BATTERY VOLTAGE<br>END<br>  | Displays and sets the battery end voltage. (For the setting, refer to the Operation Manual.)<br>Battery end voltage setting<br>10.5 to 11.5 V (in units of 0.1 V)<br>“0” is displayed on the LCD when the setting is OK.<br>“E” is displayed on the LCD when the setting is NG. |
| DIAG 5 | |
| VITC INSERT LINE<br>  <br> | Displays and sets the VITC insertion line.<br>12 to 19 lines (For NTSC)<br>9 to 22 lines (For PAL) |

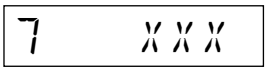
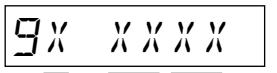
http://getMANUAL.com



| LCD Display (factory setting) | Description |
|---|---|
| DIAG 6-1<br>VTR MODE SEL-1<br>  <br> | 1. V/AU OUT : Sets the video and audio output.<br>0 : Outputs the PB/EE signal.<br>1 : Outputs the EE signal.<br>2. AU OUT (F/R) : Sets the audio output during FF/REW. (Valid when V/AU OUT is set to 0.)<br>0 : Outputs the EE signal.<br>1 : Outputs no signal.<br>3. AU OUT CH : Sets the audio output channel.<br>0 : CH1/2<br>1 : CH3/4<br>4. AU REC CH3/4 : Selects the source during recording in CH3/4. (Valid when no camera adapter (CA-701) is connected or when AU ADAPTER ENABLE is disabled.)<br>0 : CH3/4<br>1 : Records the same signal as in CH1/2.<br>2 : Not use CH3/4. |
| DIAG 6-2<br>VTR MODE SEL-2<br>  <br> | 1. AU REC EMPH : Sets the audio emphasis (during recording) to ON or OFF.<br>0 : OFF<br>1 : ON<br>2. AU SG (1 kHz) : Sets whether to generate a 1 kHz test signal when a color-bar signal is generated from the internal signal generator.<br>0 : Not generates.<br>1 : Generates when the CH1 AUDIO SELECT switch on the inside panel is set to AUTO.<br>2 : Generates.<br>3. AU SG LEVEL : Sets the level of a 1 kHz test signal.<br>0 : –20 dBu (600 Ω)<br>1 : –18 dBu (600 Ω)<br>2 : –16 dBu (600 Ω)<br>4. AU ADAPTER : Sets whether to connect the camera adapter (CA-701).<br>0 : Connects.<br>1 : Not connect. |

| LCD Display (factory setting) | Description |
|---|---|
| DIAG 6-3<br>VTR MODE SEL-3<br>  <br> | 1. TC OUT : Sets the time code output.<br>0 : Outputs PB/TCG.<br>1 : Outputs TCG.<br>2. EXT-LK UBIT : Sets the LTC UB set value when the time code is locked externally.<br>0 : Internally set value<br>1 : External LTC value<br>3. EXT-LK DF/NDF : Sets the DF/NDF (NTSC only).<br>0 : Conforms to the DF/NDF switch setting on the inside panel.<br>1 : Conforms to the external LTC setting.<br>4. WATCH AUTO ADJ : Sets the internal timer automatic time correction (according to the user's bit of the unit connected to TC OUT).<br>0 : Corrects.<br>1 : Not correct.<br>5. UB WATCH MIX : Sets whether to output the time of an internal timer to the LTC UB.<br>0 : Not output.<br>1 : Outputs. |
| DIAG 6-4<br>VTR MODE SEL-4<br>  <br> | 1. REC TALLY BLINK : Sets whether the TALLY lamp blinks during battery before end and tape before end.<br>0 : Blinks.<br>1 : Lights.<br>2. LIGHT OFF NEAR END : Sets whether to turn off the light during battery before end.<br>0 : Turns off forcibly.<br>1 : Not turn off. |
| DIAG 6-5<br>VTR MODE SEL-5<br>  <br> | 1. REC START/STOP TONE : Sets whether to output a sound when the REC START/STOP button is pressed.<br>0 : Outputs no sound.<br>1 : Outputs a sound.<br>2. SHOT NO. RESET : Sets whether to reset the shot number automatically during tape-threading.<br>0 : Resets automatically.<br>1 : Not reset.<br>3. SHOT TIME DISP : Sets the format of the time displayed on the LCD.<br>0 : Month Day : Hour Minute<br>1 : Day Month : Hour Minute<br>2 : Day : Hour Minute Second |

| LCD Display (factory setting) | Description |
|---|---|
| DIAG 6-6<br>VTR MODE SEL-6<br>  <br> | 1. LTC UBIT : Sets the data recorded in the user bits of LTC.<br>0 : Fixed data (Conventional-type user bits)<br>1 : Time of internal timer (in real time)<br>2 : Shot data<br>2. LTC UB-MARKER : Sets whether to write the mark below in the user bits of LTC.<br>REC start mark<br>Shot mark 1<br>Shot mark 2<br>0 : Conform to the menu setting below.<br>1 : Writes all marks.<br>2 : Writes nothing.<br>3. REC START MARKER<br>(Valid when the LTC UB-maker is set to SW.)<br>0 : Writes.<br>1 : Not write.<br>4. SHOT MARKER 1<br>(Valid when the LTC UB-marker is set to SW.)<br>0 : Writes.<br>1 : Not write.<br>5. SHOT MARKER 2<br>(Valid when the LTC UB-marker is set to SW.)<br>0 : Writes.<br>1 : Not write. |
| DIAG 6-7<br>VTR MODE SEL-7<br>  <br> | 1. VITC UBIT : Sets the data recorded in the user bits of VITC.<br>0 : Fixed data (Conventional-type user bits)<br>1 : Time of internal timer (in real time)<br>2 : Shot data<br>2. SHOT DATA : Sets the data length of the VITC shot data.<br>0 : Record data of date, time, model ID, serial No., cassette No., shot No.<br>1 : Record data of date, time, model ID, serial No., cassette No., shot No., shot ID 1 to 4. |
| DIAG 6-8<br>VTR MODE SEL-8<br>  <br> | 1. NTSC/PAL SW : Sets the NTSC or PAL systems.<br>0 : Conforms to the NTSC/PAL switch setting on the inside panel.<br>1 : NTSC<br>2 : PAL<br>2. DF/NDF : Sets the DF or NDF. (Valid for NTSC only.)<br>0 : Drop frame<br>1 : Non-drop frame<br>3. RE SW AS RETURN : Sets whether to use the rotary encoder as the record start switch of a shot marker.<br>0 : Uses.<br>1 : Not use.<br>4. SAVE : Sets whether to effect the SAVE switch.<br>0 : Effects.<br>1 : Not effect. |

| LCD Display (factory setting) | Description |
|---|---|
| DIAG 7 | |
| WATCH REVISION<br>  | Sets the corrected value of an internal timer (the number of frames a day). |
| DIAG 8 | |
| LCD/LAMP CHECK<br> | Sets the LCD light check.<br>All the lamps are turned on or off every time the SHIFT button is pressed. |
| DIAG 9<br>  <br>STATE CODE<br>TROUBLE CODE | |

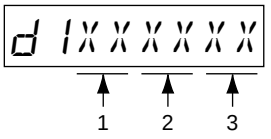
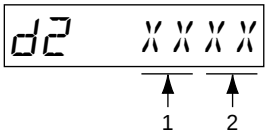
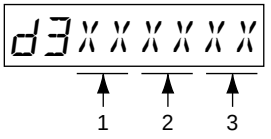
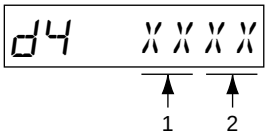
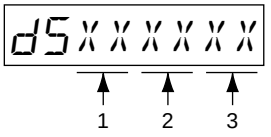
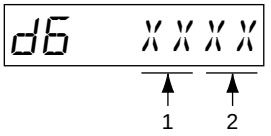
1. SLACK DATA 1 ..... Slack trouble code 1 (latest)
   Slack state code 1 (latest)
2. SLACK DATA 2 ..... Slack trouble code 2
   Slack state code 2
3. SLACK DATA 3 ..... Slack trouble code 3
   Slack state code 3
4. SLACK DATA 4 ..... Slack trouble code 4
   Slack state code 4

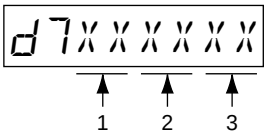
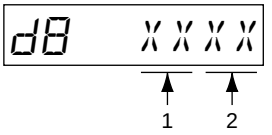
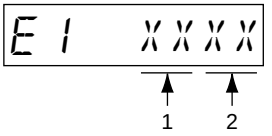
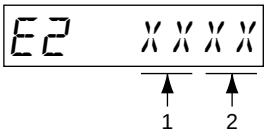
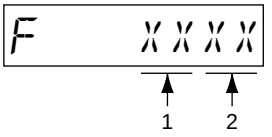
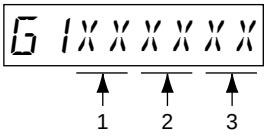
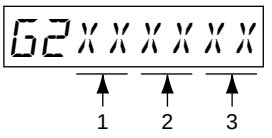
・Contents of slack trouble code

10 : Abnormal drum drive voltage
11 : No drum FG output
12 : No drum PG output
20 : Abnormal capstan drive voltage
21 : No capstan FG-A output
22 : No capstan FG-B output
23 : Abnormal forward/reverse rotation of capstan
24 : Abnormal capstan speed (high-speed)
32 : No S reel FG output
42 : No T reel FG output
61 : Time over the forward rotation time of function cam
62 : Time over the reverse rotation time of function cam
63 : Time over the tape top sensor
64 : Time over the full top sensor
65 : Time over the end sensor time
70 : Servo NVRAM checksum error
71 : Communication error between servo CPUs

・Contents of slack state code

00 : Power-on initialization
1x : No cassette and standby state
2x : Record
3x : Stop
4x : FF/REW
5x : Playback
6x : REC PAUSE
7x : REC REVIEW
8x : Threading/unthreading

| LCD Display (factory setting) | Description |
|---|---|
| DIAG D-1 | |
| PG EQ ADJ DATA-1<br>  <br> | Displays the equalizer adjustment data (A-CH).<br>1. A-CH FREQ<br>2. A-CH PHASE<br>3. A-CH GAIN |
| DIAG D-2 | |
| PG EQ ADJ DATA-2<br>  <br> | Displays the equalizer adjustment data (A-CH).<br>1. A-CH ENV<br>2. A-CH PLL |
| DIAG D-3 | |
| PG EQ ADJ DATA-3<br>  <br> | Displays the equalizer adjustment data (B-CH).<br>1. B-CH FREQ<br>2. B-CH PHASE<br>3. B-CH GAIN |
| DIAG D-4 | |
| PG EQ ADJ DATA-4<br>  <br> | Displays the equalizer adjustment data (B-CH).<br>1. B-CH ENV<br>2. B-CH PLL |
| DIAG D-5 | |
| PG EQ ADJ DATA-5<br>  <br> | Displays the equalizer adjustment data (C-CH).<br>1. C-CH FREQ<br>2. C-CH PHASE<br>3. C-CH GAIN |
| DIAG D-6 | |
| PG EQ ADJ DATA-6<br>  <br> | Displays the equalizer adjustment data (C-CH).<br>1. C-CH ENV<br>2. C-CH PLL |

| LCD Display (factory setting) | Description |
|---|---|
| DIAG D-7<br>PG EQ ADJ DATA-7<br>  <br> | Displays the equalizer adjustment data (D-CH).<br>1. D-CH FREQ<br>2. D-CH PHASE<br>3. D-CH GAIN |
| DIAG D-8<br>PG EQ ADJ DATA-8<br>  <br> | Displays the equalizer adjustment data (D-CH).<br>1. D-CH ENV<br>2. D-CH PLL |
| DIAG E-1<br>REC CURRENT DATA-1<br>  <br> | Displays the REC current adjustment data.<br>1. A-CH<br>2. B-CH |
| DIAG E-2<br>REC CURRENT DATA-2<br>  <br> | Displays the REC current adjustment data.<br>1. C-CH<br>2. D-CH |
| DIAG F<br>PB VIDEO ADJ DATA<br>  <br> | Displays the PB video adjustment data.<br>1. VIDEO LEVEL<br>2. INT BURST FRQ |
| DIAG G-1<br>REC VIDEO ADJ DATA-1<br>  <br> | Displays the REC video adjustment data.<br>1. VIDEO PHASE<br>2. R-Y DELAY<br>3. B-Y DELAY |
| DIAG G-2<br>REC VIDEO ADJ DATA-1<br>  <br> | Displays the REC video adjustment data.<br>1. Y LEVEL<br>2. R-Y LEVEL<br>3. B-Y LEVEL |

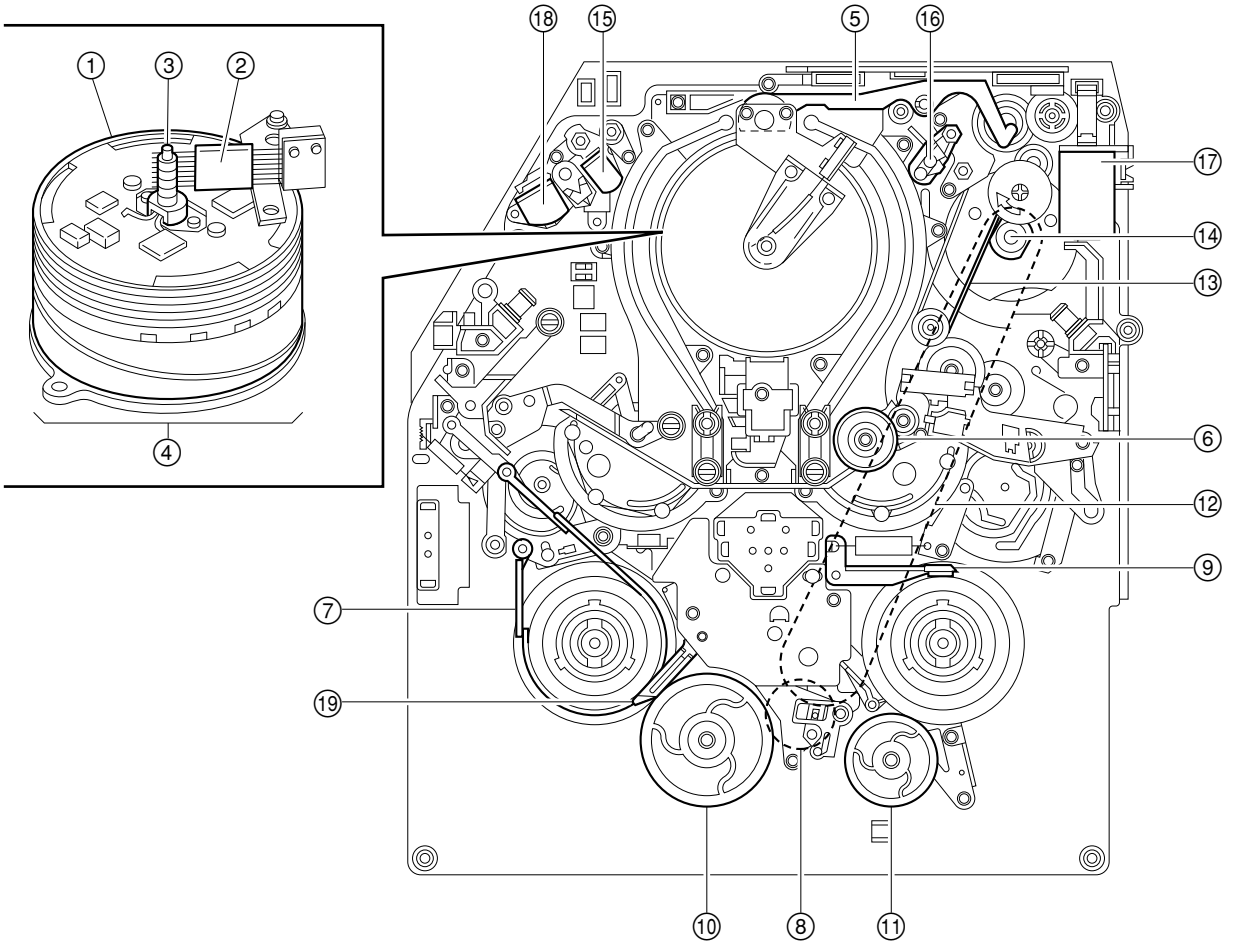
# Section 3
# Part Replacement

## 3-1. General Information for Part Replacement and Adjustment

**Note**

In the part replacement described in this section, parts can be replaced with the mechanical deck assembly installed in the main unit unless otherwise specified.
In the illustration of this section, the main unit's frame is omitted.

### 3-1-1. Index




| No. | Name | Section |
|---|---|---|
| 1 | Upper drum assembly | 3-2-1 |
| 2 | Slip ring brush assembly | 3-2-2 |
| 3 | Slip ring assembly | 3-2-3 |
| 4 | Drum assembly | 3-2-4 |
| 5 | VH cleaner assembly | 3-2-5 |
| 6 | Pinch roller | 3-2-6 |
| 7 | Tension regulator band assembly | 3-2-7 |
| 8 | Reel drive gear assembly | 3-2-8 |
| 9 | T soft break assembly | 3-3-1 |
| 10 | S idler assembly | 3-3-2 |

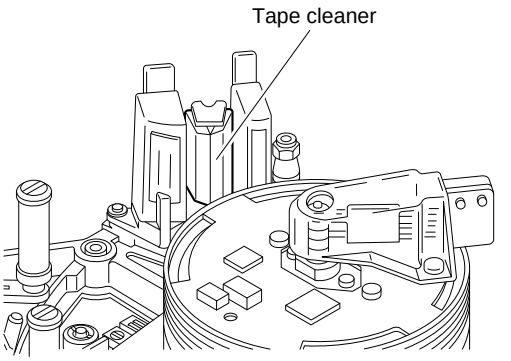
| No. | Name | Section |
|---|---|---|
| 11 | T idler assembly | 3-3-2 |
| 12 | Timing belt (reel) | 3-3-3 |
| 13 | Timing belt (threading) | 3-3-4 |
| 14 | Capstan motor | 3-3-5 |
| 15 | CTL head | 3-3-6 |
| 16 | TC head | 3-3-7 |
| 17 | Threading motor | 3-3-13 |
| 18 | FE head | 3-3-14 |
| 19 | S soft break assembly | 3-3-2 |

## 3-1-2. Precautions

### 1. Tape cleaner

**CAUTION**

Never touch the tape cleaner on the entrance head block with bare hands.
The tape cleaner has a sharp edge. Pay careful attention when replacing or adjusting the parts around the tape cleaner.




### 2. Cleaning of tools

Be sure to clean the surface of a tool before it is used.

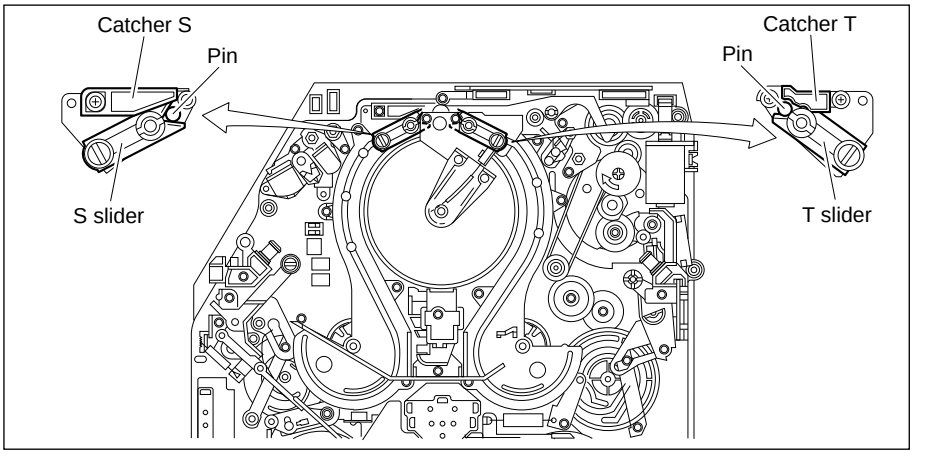
- Cleaning cloth 3-184-527-01
- Cleaning fluid 9-919-573-01

Be careful not to damage the tool during handling. If so, no accurate adjustment may be able to be performed.

## 3-1-3. Threading End State/Unthreading End State

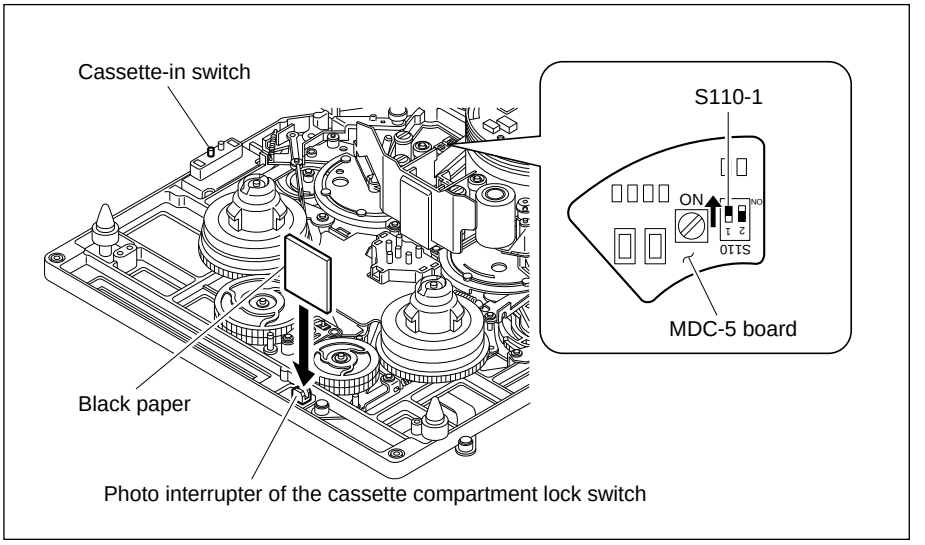
### 1. Threading end state

In the threading end state, the S and T sliders move from near the reel table to both sides of the drum and stop at the pins of catchers S and T.




(1) How to enter the threading end state using tape
   (a) Insert the cassette tape into the cassette compartment.
   (b) Close the front lid.

(2) How to enter the threading end state without using tape
   (a) Put the cassette compartment into the down state.
   (If no cassette compartment has been installed, shut off the photo interrupter of the cassette compartment lock switch on the SE board with black paper.)
   (b) Set the S110-1 switch on the MDC-5 board to ON.
   (c) Press the cassette-in switch for about one second in the condition described above.
   (d) Set the S110-1 switch on the MDC-5 board to OFF.




(3) How to enter the threading end state manually
   Turn the warm wheel of the manual eject assembly. (Refer to section 3-1-4.)

### 2. Unthreading end state

In the unthreading end state, the S and T sliders move from catchers S and T to the reel table and stop. This state also corresponds to the STANDBY state.
At that time, the cassette compartment is put into the up state.

(1) How to enter the unthreading end state
Press the EJECT button.

(2) How to enter the unthreading end state manually
Turn the warm wheel of the manual eject assembly. (Refer to section 3-1-4.)

**Note**

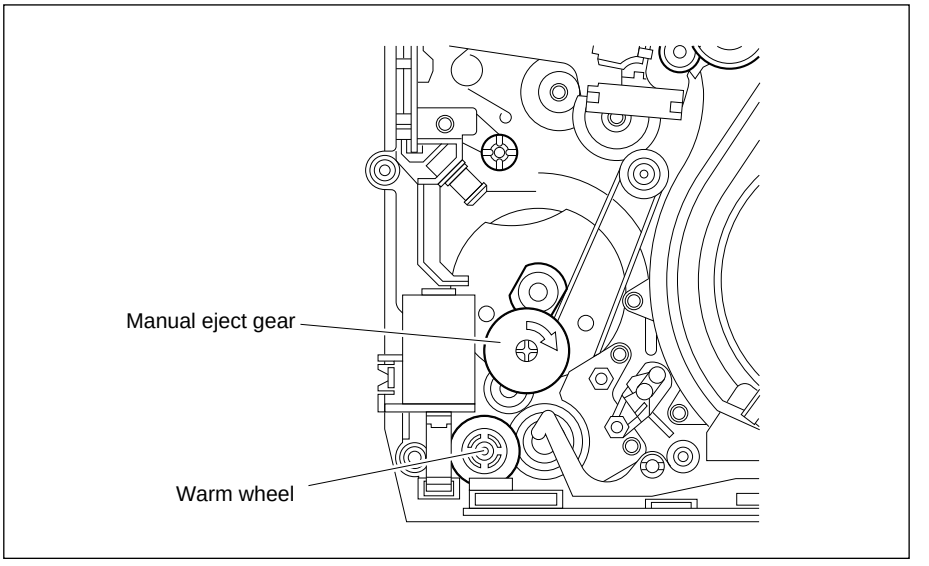
For how to enter the unthreading end state with the cassette tape inserted, refer to section 1-11 in Part 1 of the Maintenance Manual.

## 3-1-4. Precaution during Manual Ejection

Even if the power is not turned on, the unit can be put into the threading end or unthreading end state by turning the warm wheel of the manual eject assembly or the manual eject gear.
But the manual eject gear functions only in the unthreading direction.
The warm wheel functions in the both threading and unthreading directions.

**Notes**

- Do not turn each manual eject gear continuously more than required. If so, the parts that constitute the unit may be damaged.
  To turn the warm wheel, use a Phillips screwdriver (for M3).
  Phillips screwdriver (for M3) 7-700-749-01
- The warm wheel has been installed so that it can be used by the engineer during tape slacking.



http://getMANUAL.com



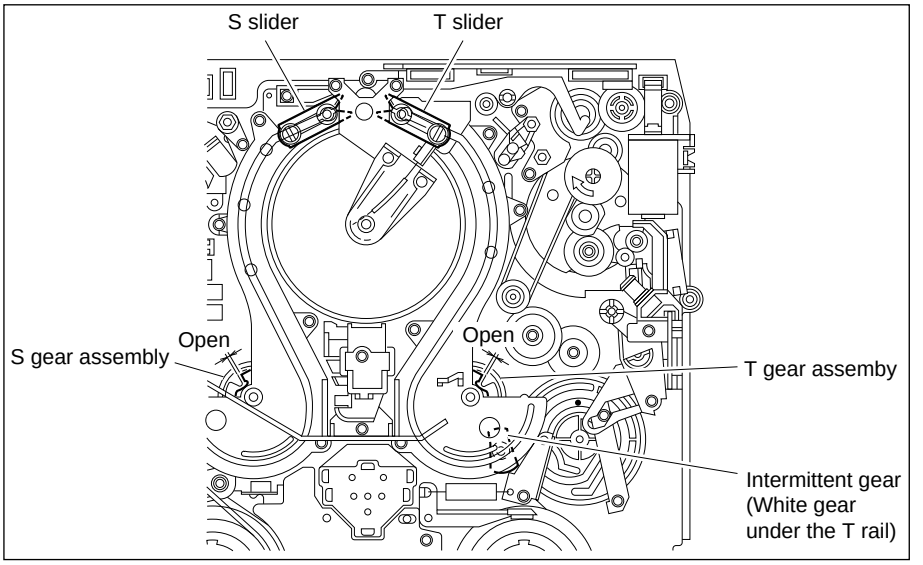
### Threading end

Turn the warm wheel clockwise using a Phillips screwdriver.

In this state, the rotation of the intermittent gear stops, and the illustrated sections of the S gear assembly and T gear assembly are opened fully.

**Note**

If turning the warm wheel in the threading direction even further, the parts that constitute the unit may be damaged.



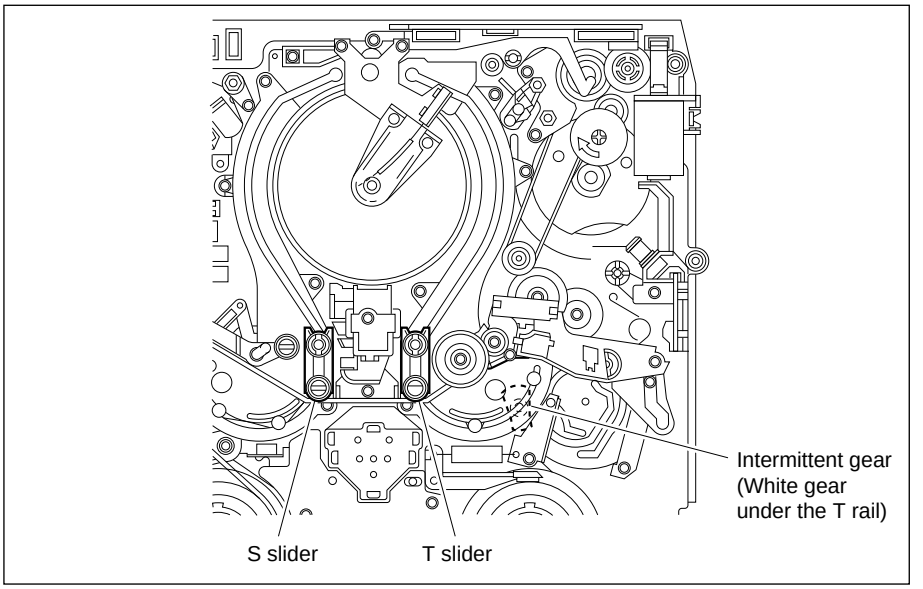

### Unthreading end

Turn the manual eject gear clockwise while pushing it downward or turn the warm wheel counterclockwise using a Phillips screwdriver.

In this state, the cassette compartment is put in the up state.
When no cassette compartment is installed, the S and T sliders reach the position shown in the figure and the rotation of the intermittent gear stops.

**Note**

If turning the warm wheel or manual eject gear in the unthreading direction even further, the parts that constitute the unit may be damaged.

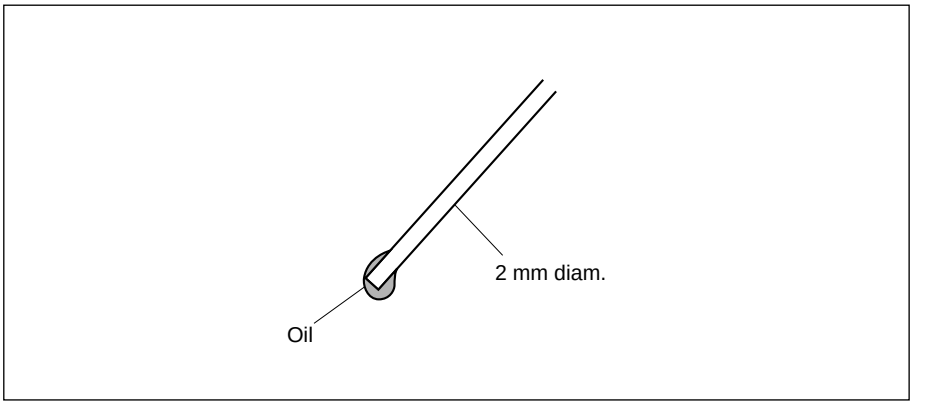


## 3-1-5. Oil and Grease

Do not use ones other than the specified oil and grease.
If so, the unit may be seriously damaged because of difference in viscosity or components.
Moreover, do not use oil and grease in which dust is mixed. This may also cause a serious trouble.
The oil and grease used for this model are as follows:

| | |
|---|---|
| Oil | 7-661-018-18 |
| Grease (SGL-601) | 7-651-000-10 |
| Grease (SGL-801) | 7-651-000-11 |

- A drop of oil indicates the amount of oil at the tip of a stick with a diameter of 2 mm shown in the figure.
- Apply grease so that a thin film occurs on the application surface.
  Be sure to wipe the grease except on the surface with cloth (gauze, etc.).
- Do not apply oil and grease to ones other than the specified place.



## 3-1-6. Notes on Tightening Torque and Washer

### 1. Tightening torque of screw and recommended screwdriver

Two types of screws are usually used for this model.
To loosen or tighten these screws, use the specified tool. Tighten these screws at the specified tightening torque using a torque screwdriver when tightening them.

| | |
|---|---|
| Torque screwdriver bit (for M1.4) | J-6325-110-A |
| Torque screwdriver bit (for M2) | J-6325-380-A |
| Screwdriver hexagon bit (across 1.5 mm) | J-6326-120-A |
| Torque screwdriver (for 3 kg) | J-6325-400-A |

Tightening torque

| | |
|---|---|
| M1.4(+) screw | $9\times10^{-2}$ N•m (0.9 kgf•cm) |
| M2(+) screw | $20\times10^{-2}$ N•m (2.0 kgf•cm) |
| Hexagonal head screw | $19\times10^{-2}$ N•m (1.9 kgf•cm) |

**Note**

This model uses screws of small size. These screws may fall in the unit during removal and installation. To prevent from the falling, it is recommended to magnetize the screwdriver bit.

### 2. Stop washer

Never re-use the pre-used washers. Be sure to use a new stop washer during part installation.

| | |
|---|---|
| Stop washer | 3-559-408-11 |

Removing the stop washer

(a) Remove the stop washer using a pair of small nippers or tweezers.

**Note**

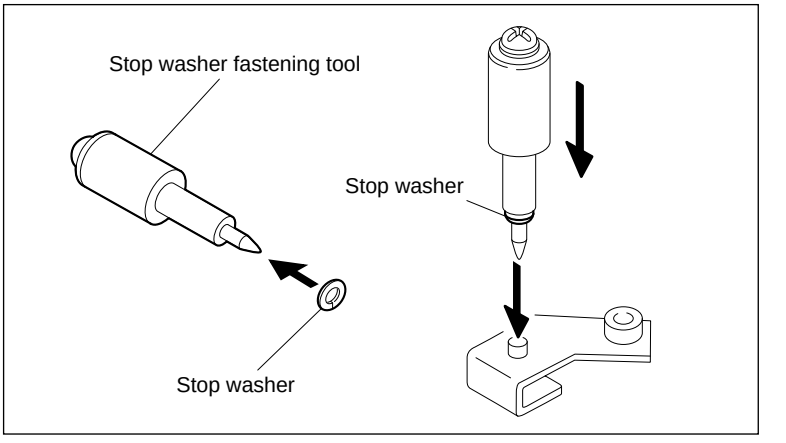
- Be careful not to fall the stop washer in the unit.
- Take care that the tool does not touch other parts, especially, the drum.

Installing the stop washer

It is recommends to use the following tool when installing a stop washer.

Stop washer fastening tool J-6323-530-A

(a) Put a stop washer to the top of a stop washer fastening tool.
(b) Put the top of the tool vertically on the top of the shaft to be installed.
(c) Press down the tool and install the stop washer to the shaft.



# 3-2. Replacement of Periodic Replacement Part

## 3-2-1. Upper Drum Assembly Replacement

### Outline

#### Replacement

Brush cover removal
Brush assembly removal
Slip ring assembly removal
Upper drum assembly removal
Installation surface cleaning
Upper drum assembly installation
Slip ring assembly installation
Brush assembly installation
Brush cover installation
Head and tape running path cleaning

#### Adjustment after replacement

Tape running adjustment
Video tracking adjustment
CTL head height confirmation
CTL head position adjustment
TC head height confirmation
TC head position adjustment
PG phase adjustment
Servo automatic adjustment
Video system adjustment (equalizer)

### Precaution

Replace the upper drum assembly when the rotary head is worn or damaged. The upper drum assembly cannot be replaced by only the head chip.

### Basic knowledge

For except periodic replacement, replace the upper drum assembly in the following case.

- When correct RF waveforms can not be obtained even if the tracking adjustment is performed

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

The upper drum assembly can be replaced with the cassette compartment installed in the unit.

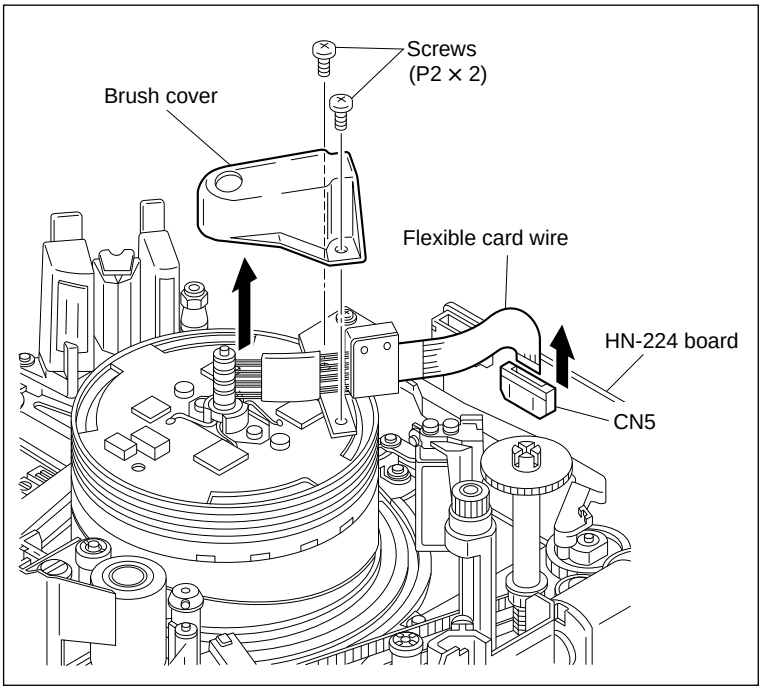
## Tools

| | |
|---|---|
| • Upper drum remover | Supplied accessory |
| • Torque screwdriver bit (for M2) | J-6325-380-A |
| • Setscrew hexagon bit (across 1.5 mm) | J-6326-120-A |
| • Torque screwdriver (for 3 kg) | J-6325-400-A |
| • L wrench (across 1.5 mm) | 7-700-736-05 |
| • Cleaning cloth | 3-184-527-01 |
| • Cleaning fluid | 9-919-573-01 |

## Removal

### 1. Brush cover removal

(1) Disconnect the flexible card wire from the connector CN5 on the HN-224 board.
(2) Remove the two screws, then remove the brush cover.

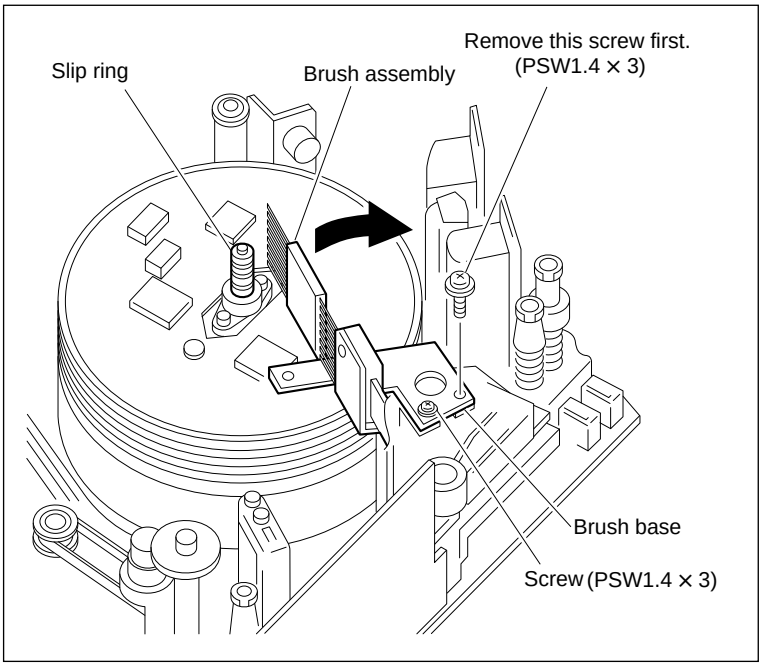



### 2. Brush assembly removal

(1) Remove the specified one of the two screws fixing the brush base as shown in the figure.
(2) Loosen the other screw and move the brush base in the direction indicated by the arrow. The engagement of the brush and slip ring is then released.
(3) Remove the screws, then remove the brush assembly.

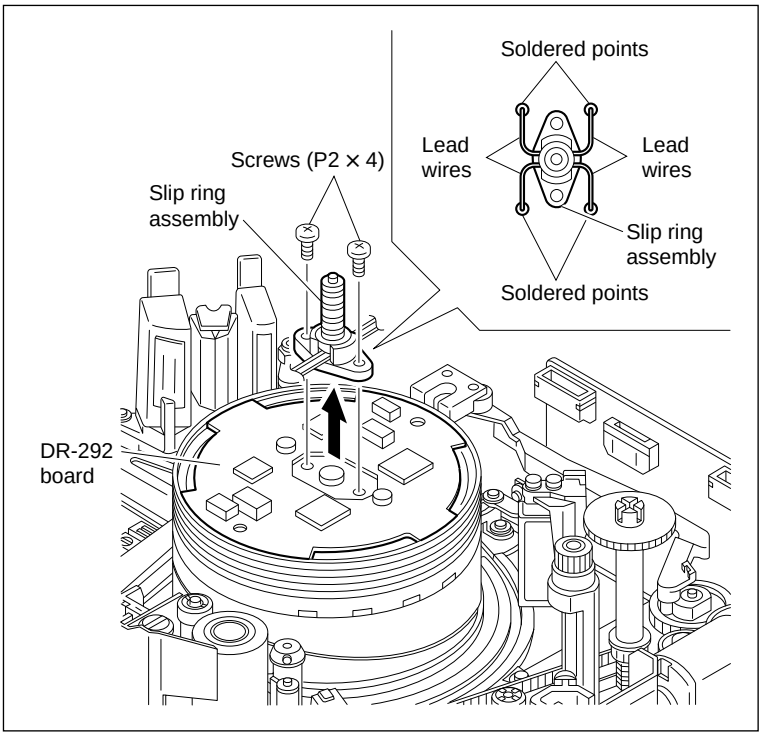
**Note**

Never touch the brush.



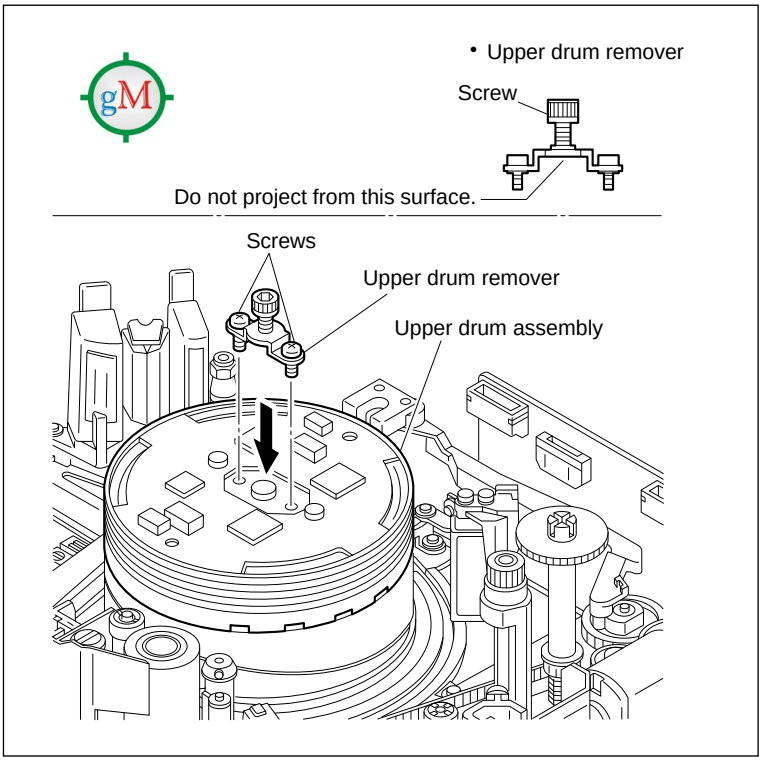
### 3. Slip ring assembly removal

(1) Desolder the four lead wires of the slip ring assembly from the DR-292 board of the upper drum assembly.
(2) Remove the two screws, then remove the slip ring assembly.




### 4. Upper drum assembly removal

(1) Prepare the upper drum remover supplied for a new upper drum assembly.
Loosen the screw of the upper drum remover so that it does not protrude from the installation surface.
(2) Install the upper drum remover on the upper drum assembly with two screws.



(3) Insert the L wrench into the board hole of the upper drum assembly and loosen the two screws fixing the upper drum assembly fully.

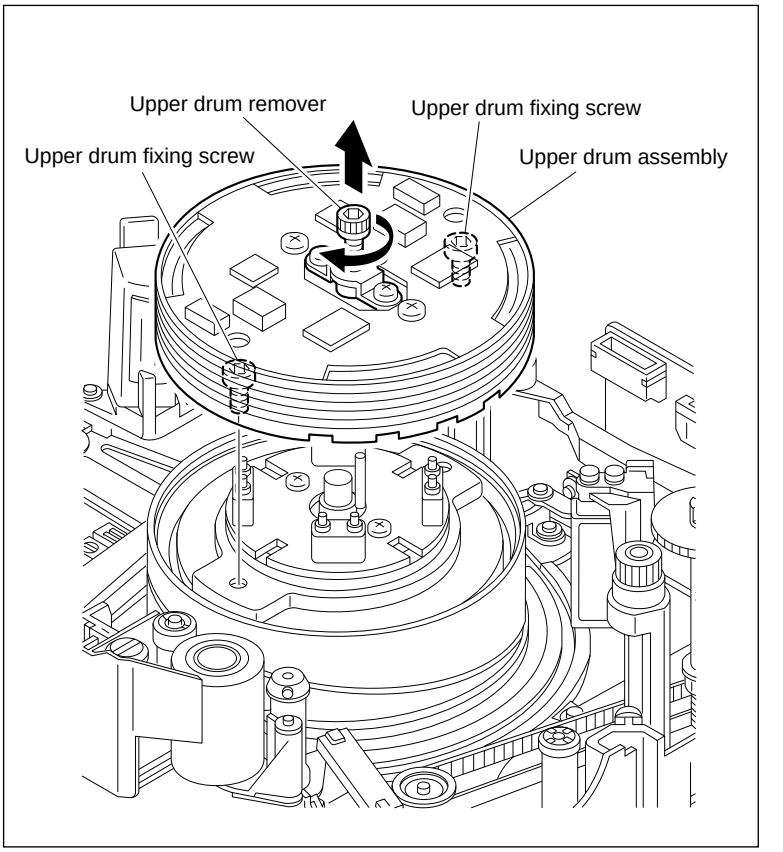
**Note**

Loosen the two screws fixing the upper drum fully until they are removed from the screw holes. Never turn the screw of the upper drum remover continuously without loosening the upper drum fixing screws completely. This may damage the lower drum.

(4) Tighten the center screw of the upper drum remover and remove the upper drum assembly in the direction indicated by the arrow.

**Note**

After the upper drum assembly is removed, be careful not to damage the upper edge of the lower drum.



## Installation

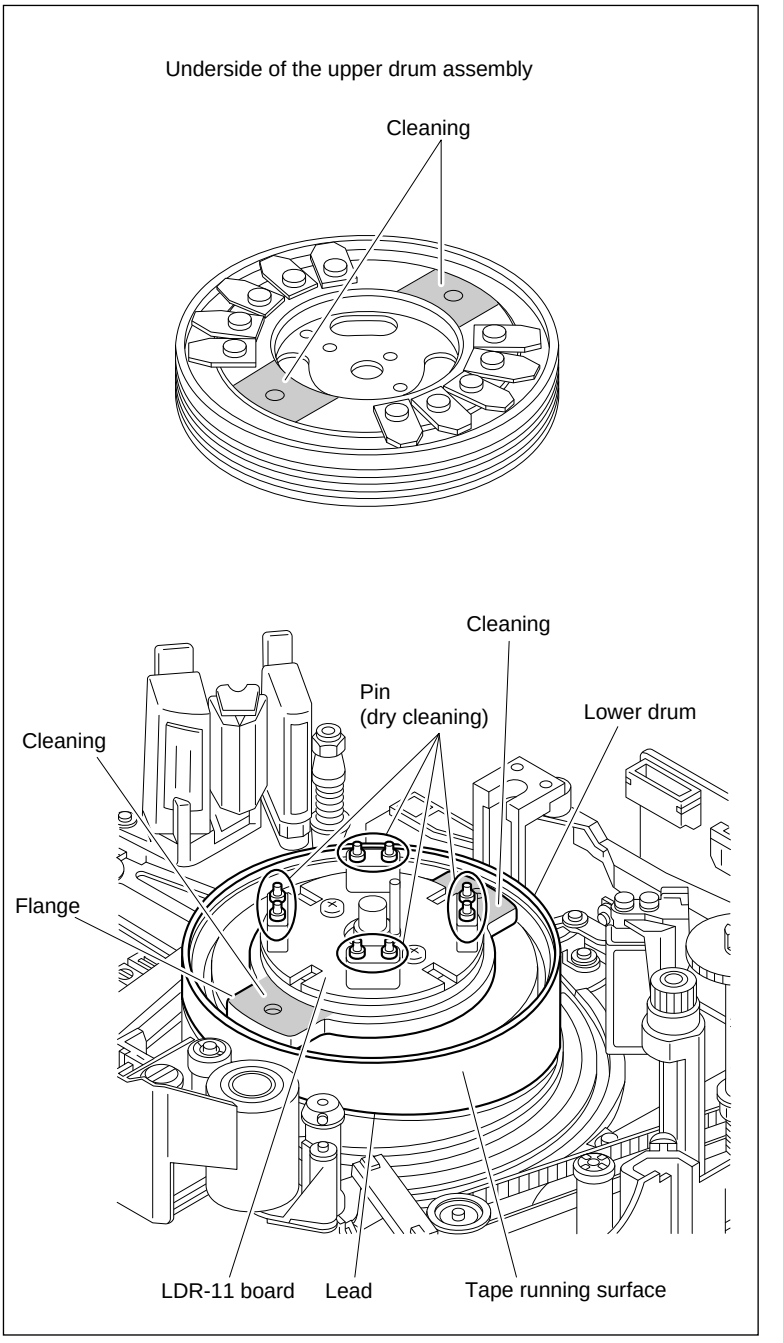
### 5. Installation surface cleaning

(1) Clean the portions below with cleaning cloth moistened with cleaning fluid.
- Flange of the lower drum (Shaded portion shown in the figure)
- Tape running surface and lead of the lower drum
- Installation surface of new upper drum assembly (Shaded portion shown in the figure)

(2) Wipe the eight contact pins on the LDR-11 board of the lower drum with dry cloth.

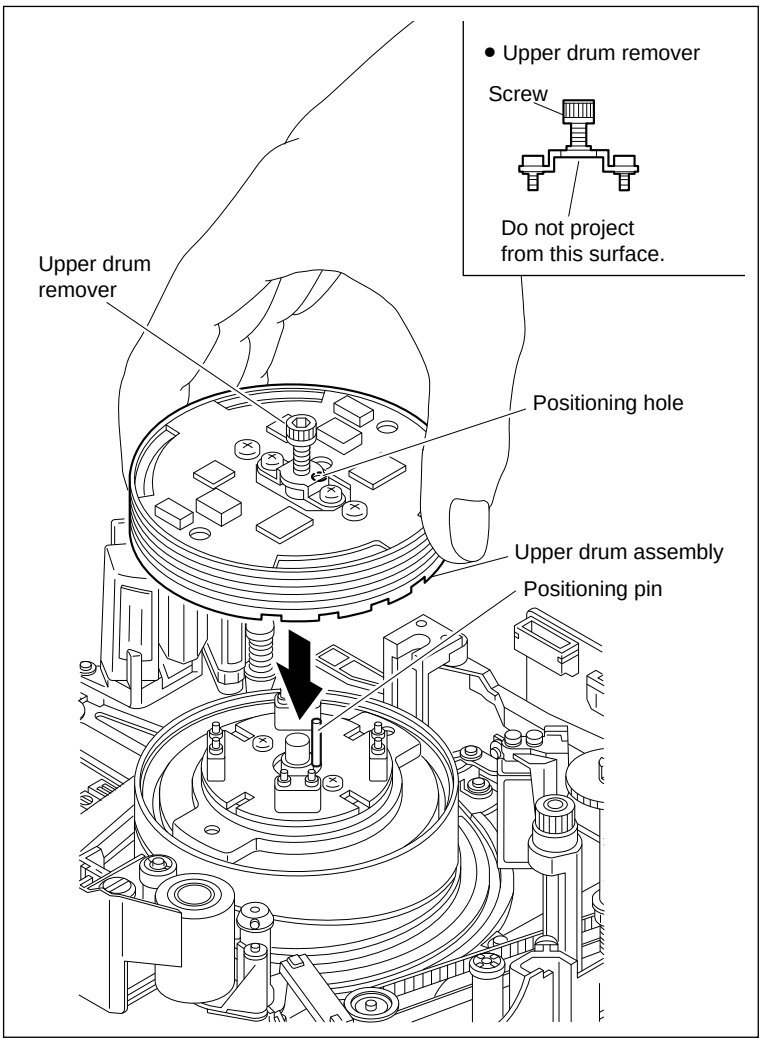
**Note**

Never clean the contact pins using a cleaning cloth moistened with cleaning fluid.



### 6. Upper drum assembly installation

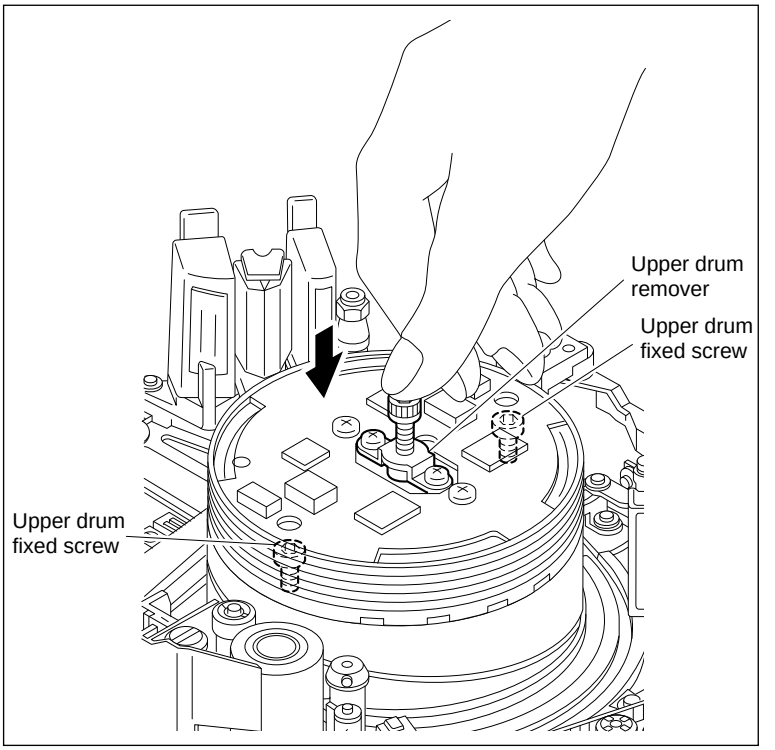
(1) Remove the upper drum remover from the removed upper drum assembly.
(2) Loosen the screw of the upper drum remover so that it does not protrude from the installation surface.
(3) Install the upper drum remover in the upper drum assembly with two screws.
(4) Align the positioning hole of the upper drum assembly with the positioning pin of the lower drum as shown in the figure and put the upper drum assembly on the lower drum. At that time, confirm that the positioning pin protrudes from the upper surface of the upper drum.




**Note**

Hold the upper drum assembly keeping away from the video head when the upper drum assembly is installed. Take care that the video head does not touch the brush support and peripheral parts during installation.
Put the upper drum assembly on the lower drum. Never push the perimeter of the upper drum assembly manually.

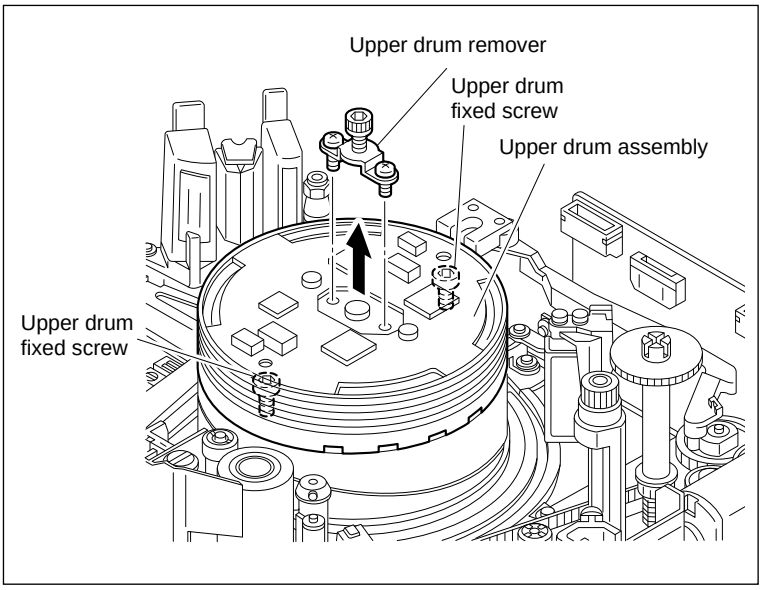
(5) Push down the center screw of the remover until the upper drum will go to the flange surface of the lower drum.
While pushing, tighten the two screws securing the upper drum with the torque screwdriver that has been set to $28 \times 10^{-2}$ N•m (2.8 kgf•cm), and then loosen one by one about 180 degree, finally tighten them with same torque again.




**Note**

Never push the perimeter of the upper drum assembly manually.

(6) Remove the two screws, then remove the upper drum remover from the upper drum assembly.




### 7. Slip ring assembly installation

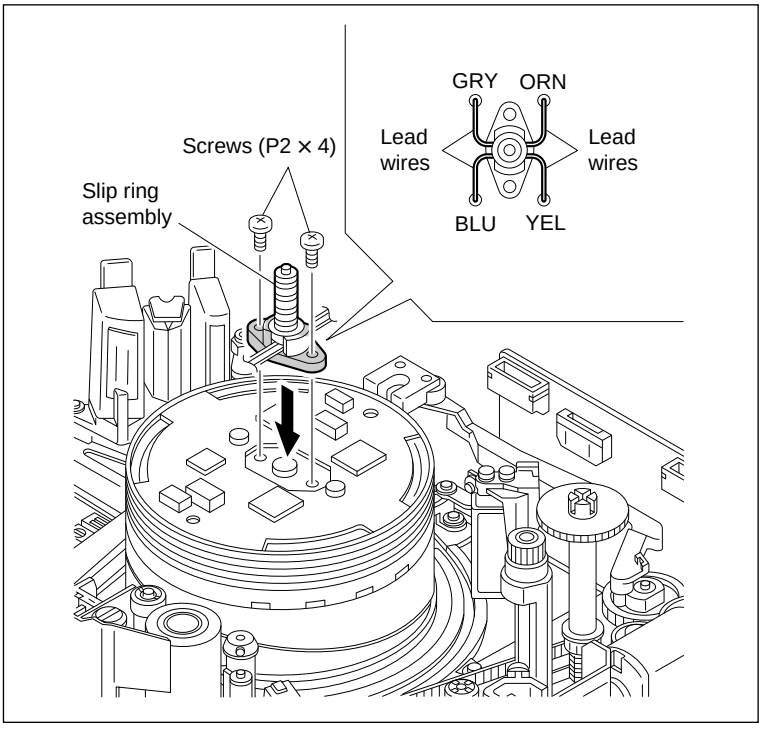
(1) Match the four lead wire colors of the slip ring assembly with the indications on the DR-292 board (GRY: gray, BLU: blue, YEL: yellow, and ORN: orange) and install the slip ring assembly in the drum shaft.

**Note**

Hold the black mold portion of the slip ring assembly during installation. Never touch the slip ring.

(2) Install the slip ring assembly with two screws.
[Tightening torque:
$15 \times 10^{-2}$ N•m (1.5 kgf•cm)]

(3) Solder the four lead wires of the slip ring assembly to the DR-292 board of the upper drum assembly.
Blue lead wire – (BLU) R-5V trace
Gray lead wire – (GRY) GND trace
Orange lead wire – (ORN) P-5V trace
Yellow lead wire – (YEL) L REC trace



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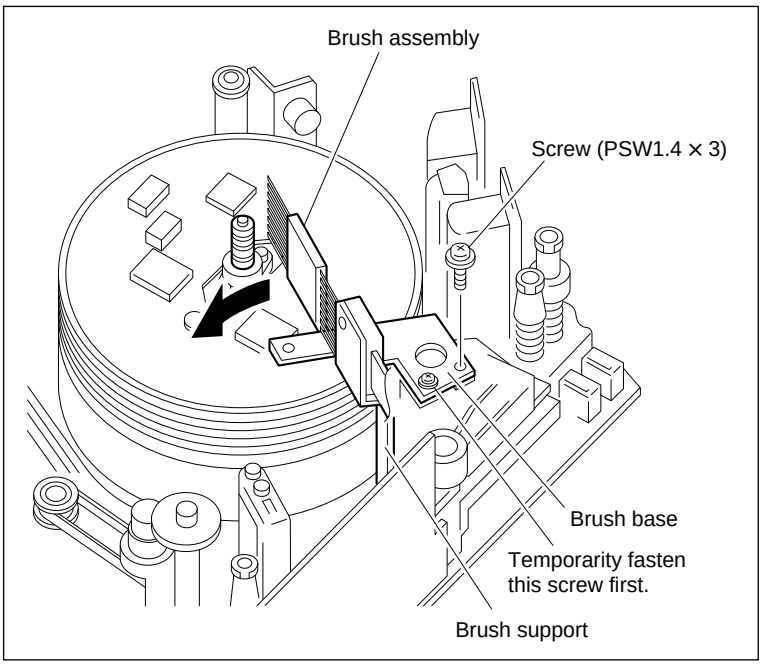
### 8. Brush assembly installation

(1) Fix the brush assembly temporarily to the brush support with the screw shown in the figure.
(2) Move the brush base at the top of the brush support in the direction indicated by the arrow while pushing it downward and fix the other screw temporarily.
(3) Tighten the screws fixed temporarily in steps (1) and (2).
[Tightening torque:
$9 \times 10^{-2}$ N•m (0.9 kgf•cm)]

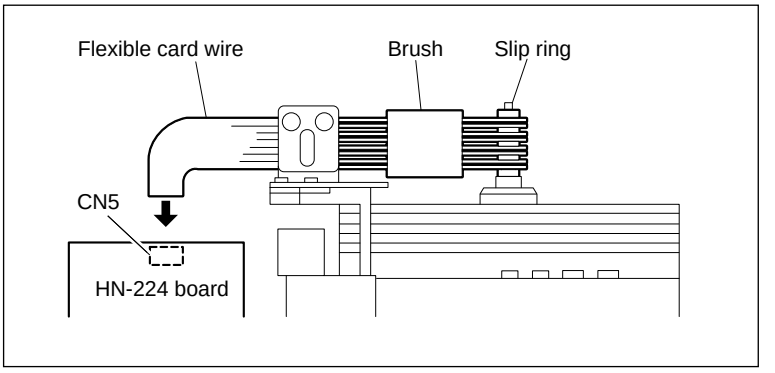



(4) Confirm that each brush touches the four grooves of the slip ring two at a time.

**Note**

The height of the brush and the contact pressure with the slip ring are automatically adjusted when steps (1) to (3) are performed.

(5) Connect the flexible card wire to the connector CN5 on the HN-224 board.




### 9. Brush cover installation

Adjust the position so that the shaft of the slip ring is in the center of the hole at the tip of the brush cover. After that, install the brush cover with two screws.
[Tightening torque: $15 \times 10^{-2}$ N•m (1.5 kgf•cm)]

### 10. Head and tape running surface cleaning

Clean the portion below with cleaning cloth moistened with cleaning fluid.
(DNV-5: Refer to section 5-1-2 and 5-1-3 in Part 1 of the Maintenance Manual.)
(DNW-7/7P/90/90P/90WS/90WSP:
Refer to section 6-1-2 and 6-1-3 in Part 1 of the Maintenance Manual.)

- Video head
- Upper drum tape running surface
- Lower drum lead and tape running surface

**Note**

After cleaning, wipe with dry cloth.

**Adjustment after replacement**

**11. Tape running adjustment**
(Refer to section 4-2-1.)

**12. Video tracking adjustment**
(Refer to section 4-2-2.)

**13. CTL head height confirmation**
(Refer to section 4-2-3.)

**14. CTL head position adjustment**
(Refer to section 4-2-4.)

**15. TC head height confirmation**
(Refer to section 4-2-5.)

**16. TC head position adjustment**
(Refer to section 4-2-6.)

**17. Servo automatic adjustment**
(Refer to section 7-3-1.)

**18. Automatic PG phase adjustment**
(Refer to section 7-3-2.)

**19. Video system adjustment (equalizer)**
(Refer to section 7-8.)

## 3-2-2. Slip Ring Brush Assembly Replacement

### Outline

### Replacement

Brush cover removal
Brush assembly removal
Brush assembly installation
Brush cover installation

### Precaution

Replace the brush assembly when the brush is worn.
Install the brush assembly in the procedure below. The relative height and contact pressure with the slip ring are then adjusted automatically. In this case, the adjustment after replacement is not required.
Never clean the brush surface using cleaning cloth moistened with cleaning fluid.

### Preparations

1. Turn off the power.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

The brush assembly can be replaced with the cassette compartment installed in the unit.

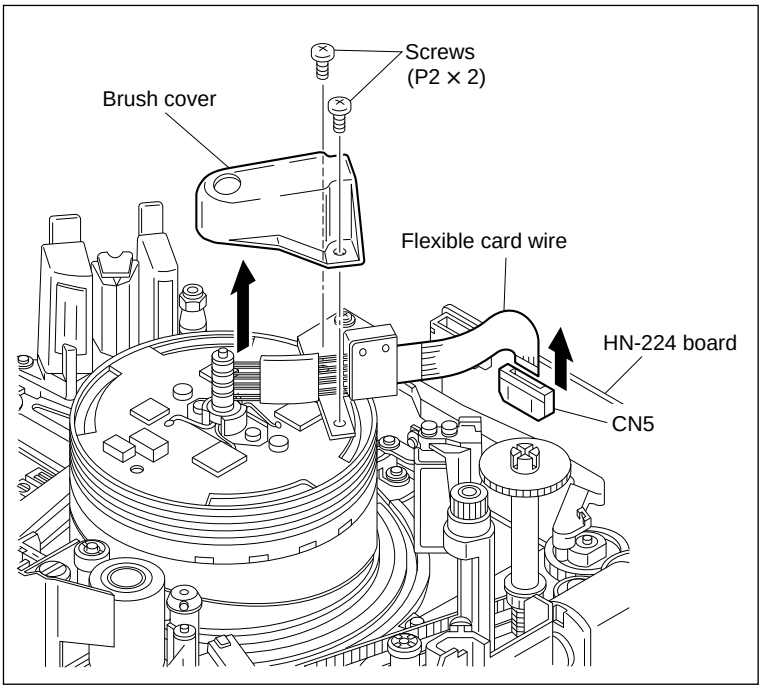
### Tools

- Torque screwdriver bit (for M2) J-6325-380-A
- Torque screwdriver (for 3 kg) J-6325-400-A

## Removal

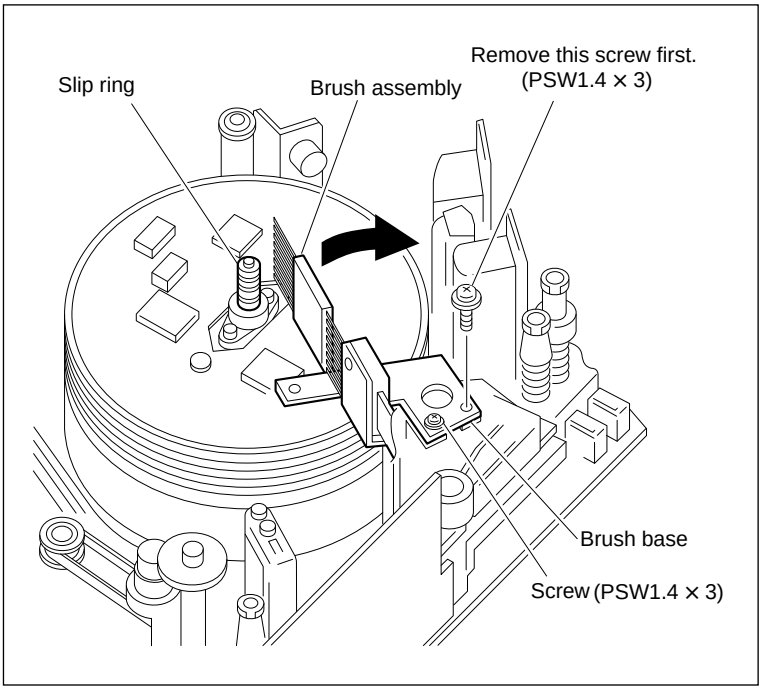
### 1. Brush cover removal

(1) Disconnect the flexible card wire from the connector CN5 on the HN-224 board.
(2) Remove the two screws, then remove the brush cover.




### 2. Brush assembly removal

(1) Remove the specified one of the two screws fixing the brush base as shown in the figure.
(2) Loosen the other screw and move the brush base in the direction indicated by the arrow. The engagement of the brush and slip ring is then released.
(3) Remove the screw, then remove the brush assembly.



## Installation

### 3. Brush assembly installation

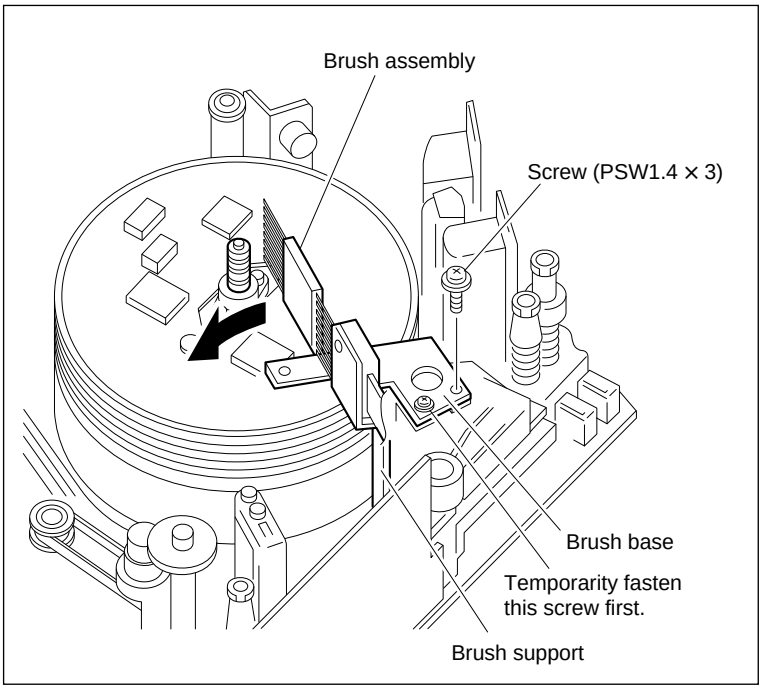
(1) Fix the brush assembly temporarily to the brush support with the screw shown in the figure.

**Note**

Never touch the brush.

(2) Move the brush base at the top of the brush support in the direction indicated by the arrow while pushing it downward and fix the other screw temporarily.

(3) Tighten the screws fixed temporarily in steps (1) and (2).

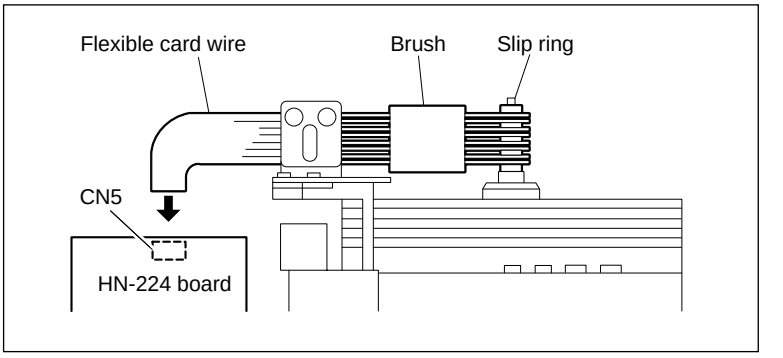



(4) Confirm that each brush touches the four grooves of the slip ring two at a time.

**Note**

The height of the brush and the contact pressure with the slip ring are automatically adjusted when steps (1) to (3) are performed.

(5) Connect the flexible card wire disconnected in step (1) to the connector CN5 on the HN-224 board.




### 4. Brush cover installation

Adjust the position so that the shaft of the slip ring is in the center of the hole at the tip of the brush cover. After that, install the brush cover with two screws.

[Tightening torque: $15 \times 10^{-2}$ N•m (1.5 kgf•cm)]

## 3-2-3. Slip Ring Assembly Replacement

### Outline

#### Replacement

Brush cover removal
Brush assembly removal
Slip ring assembly removal
Slip ring assembly installation
Brush assembly installation
Brush cover installation

### Precaution

Replace the slip ring assembly when the slip ring is worn.
The adjustment after the slip ring assembly is replaced is not required.
Never clean the slip ring surface using cleaning cloth moistened with cleaning fluid.

### Preparations

1. Turn off the power.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

The slip ring assembly can be replaced with the cassette compartment installed in the unit.

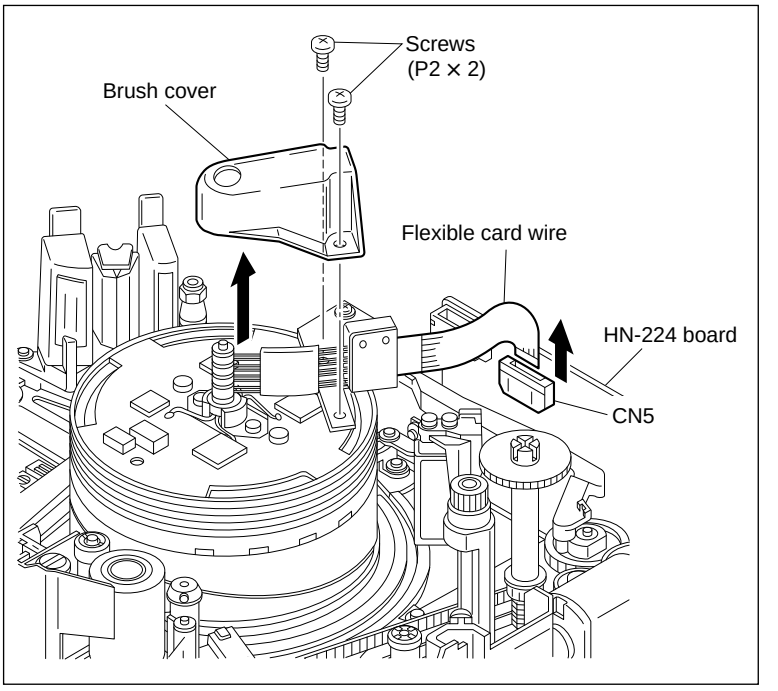
### Tools

- Torque screwdriver bit (for M2) J-6325-380-A
- Torque screwdriver (for 3 kg) J-6325-400-A

## Removal

### 1. Brush cover removal

(1) Disconnect the flexible card wire from the connector CN5 on the HN-224 board.
(2) Remove the two screws, then remove the brush cover.

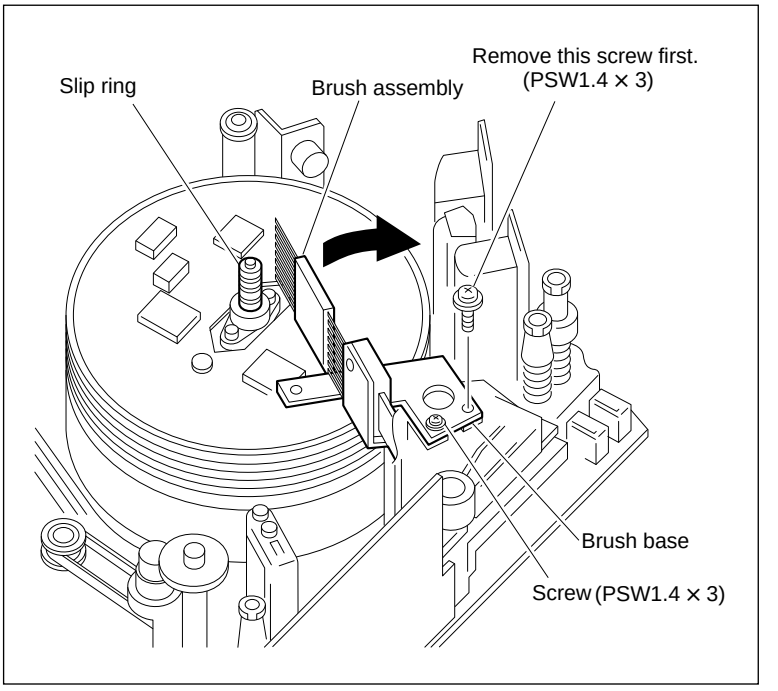



### 2. Brush assembly removal

(1) Remove the specified one of the two screws fixing the brush base as shown in the figure.
(2) Loosen the other screw and move the brush base in the direction indicated by the arrow. The engagement of the brush and slip ring is then released.
(3) Remove the screws, then remove the brush assembly.

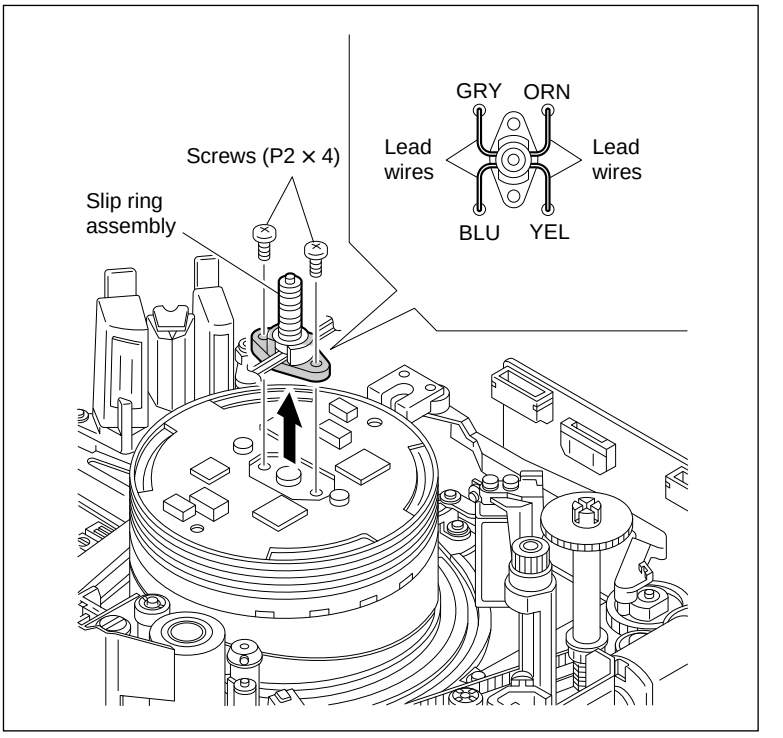
**Note**

Never touch the brush.



### 3. Slip ring assembly removal

(1) Desolder the four lead wires of the slip ring assembly from the DR-292 board of the upper drum assembly.
(2) Remove the two screws, then remove the slip ring assembly.




## Installation

### 4. Slip ring assembly installation

(1) Match the four lead wire colors of the slip ring assembly with the indications on the DR-292 board (GRY: gray, BLU: blue, YEL: yellow, and ORN: orange) and install the slip ring assembly in the drum shaft.

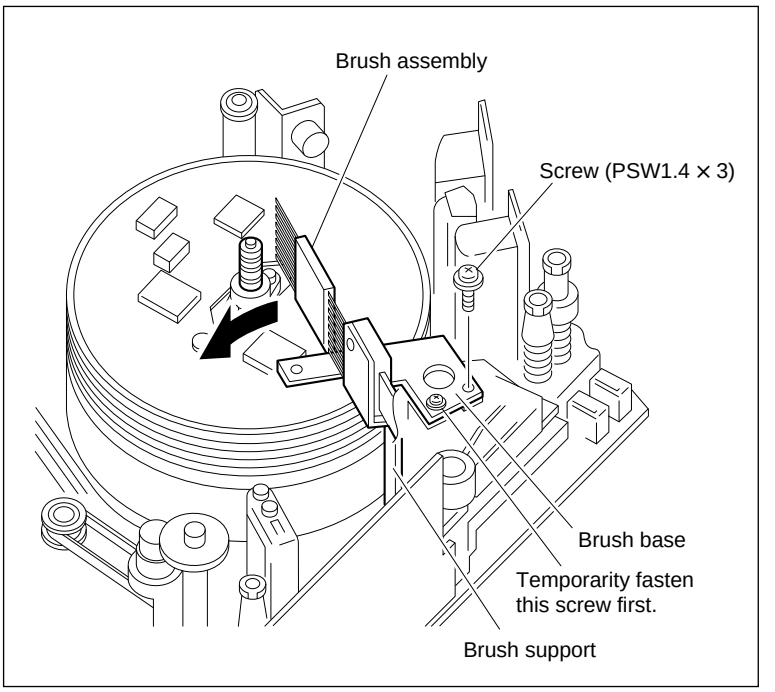
**Note**

Hold the black mold portion of the slip ring assembly during installation. Never touch the slip ring.

(2) Install the slip ring assembly with two screws.
[Tightening torque:
$15 \times 10^{-2}$ N•m (1.5 kgf•cm)]
(3) Solder the four lead wires of the slip ring assembly to the DR-292 board of the upper drum assembly.
Blue lead wire – (BLU) R-5V trace
Gray lead wire – (GRY) GND trace
Orange lead wire – (ORN) P-5V trace
Yellow lead wire – (YEL) L REC trace

### 5. Brush assembly installation

(1) Fix the brush assembly temporarily to the brush support with the screw shown in the figure.
(2) Move the brush base at the top of the brush support in the direction indicated by the arrow while pushing it downward and fix the other screw temporarily.
(3) Tighten the screws fixed temporarily in steps (1) and (2).
[Tightening torque:
$9 \times 10^{-2}$ N•m (0.9 kgf•cm)]

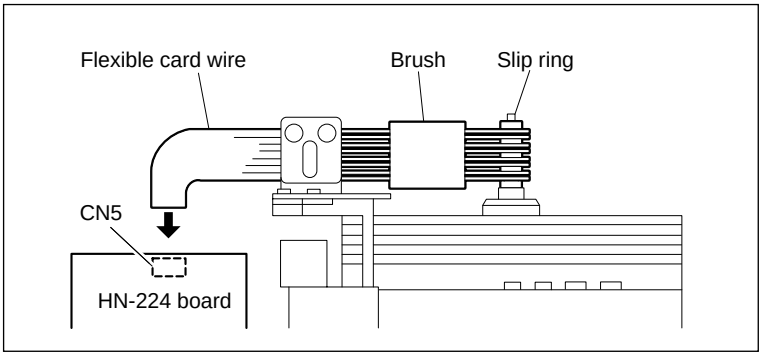



(4) Confirm that each brush touches the four grooves of the slip ring two at a time.

**Note**

The height of the brush and the contact pressure with the slip ring are automatically adjusted when steps (1) to (3) are performed.

(5) Connect the flexible card wire to the connector CN5 on the HN-224 board.




### 6. Brush cover installation

Adjust the position so that the shaft of the slip ring is in the center of the hole at the tip of the brush cover. After that, install the brush cover with two screws.
[Tightening torque: $15 \times 10^{-2}$ N•m (1.5 kgf•cm)]

## 3-2-4. Drum Assembly Replacement

### Outline

#### Replacement

VH cleaner assembly removal
Brush assembly connector disconnection
Full-top sensor removal
Drum assembly removal
Installation surface cleaning
Drum assembly installation
Brush assembly connector connection
Full-top sensor installation
VH cleaner assembly installation
Head and tape running surface cleaning

#### Adjustment after replacement

Tape running adjustment
Video tracking adjustment
CTL head height confirmation
CTL head position adjustment
TC head height confirmation
TC head position adjustment
PG phase adjustment
Servo automatic adjustment
Video system adjustment (equalizer)

### Precaution

Be careful not to damage the CTL head, TC head, and peripheral tape guide when replacing the drum assembly.
Take care that the video heads of the drum assembly are not damaged during replacement.

### Basic knowledge

For except periodic replacement, replace the drum assembly in the following cases.

- When the tape running path of the lower drum is damaged and cannot be restored
- When correct RF waveforms cannot be obtained due to the worn lower drum even if the tracking adjustment is performed
- When the bearing reaches its life and the VTR performance cannot be satisfied due to noises or jitters

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## Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

The drum assembly can be replaced with the cassette compartment installed in the unit.

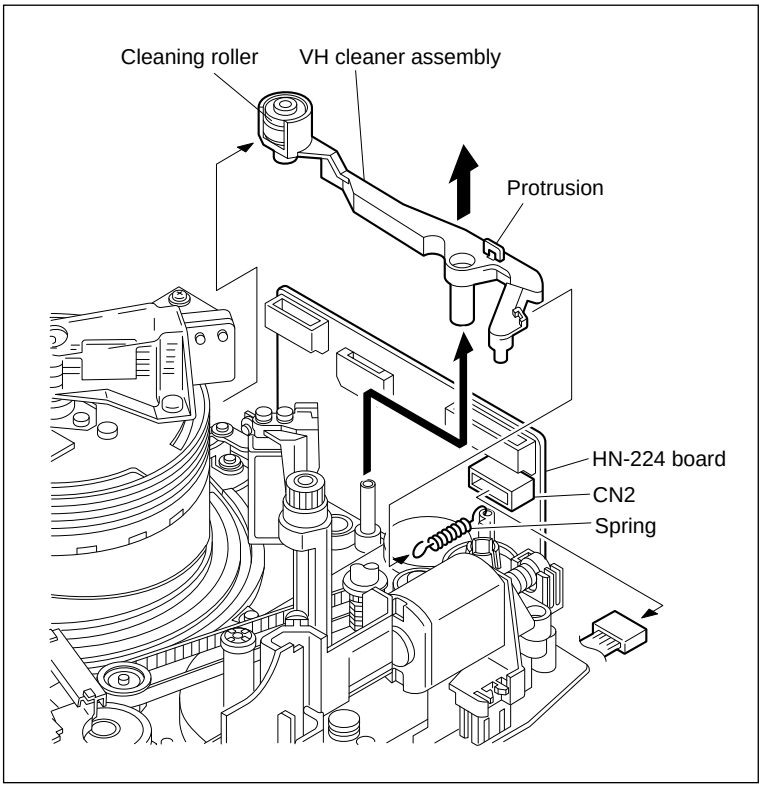
## Tools

- Torque screwdriver bit (for M2) J-6325-380-A
- Torque screwdriver (for 3 kg) J-6325-400-A
- Cleaning cloth 3-184-527-01
- Cleaning fluid 9-919-573-01

## Removal

### 1. VH cleaner removal

(1) Put the unit into the unthreading end state. (Refer to section 3-1-3.)
(2) Turn the manual eject gear clockwise so that the cleaning roller of the VH cleaner is released from the drum.
(3) Disconnect the connector CN2 on the HN-224 board.
(4) Remove the spring shown in the figure, hold the protrusion of the VH cleaner using a pair of tweezers, and remove the VH cleaner from the unit.




### 2. Brush assembly connector disconnection

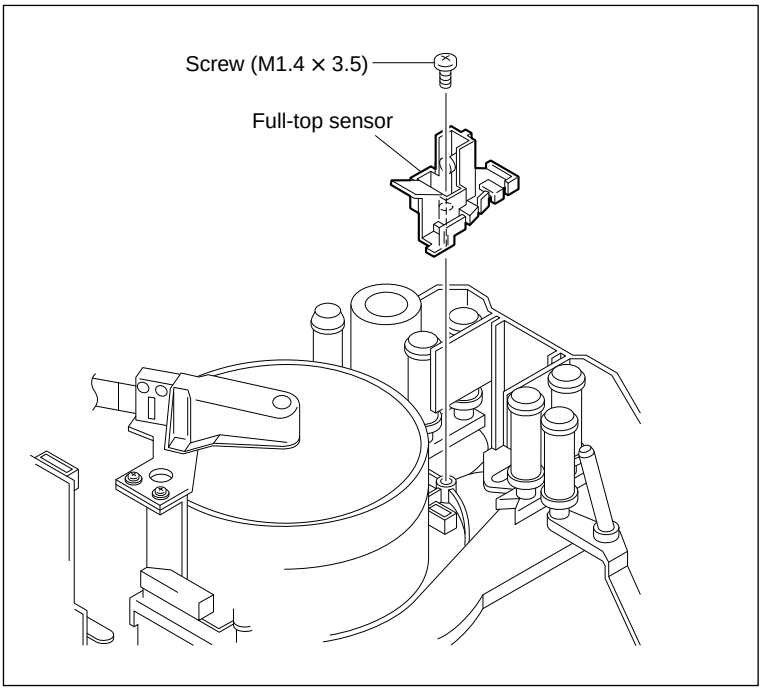
Disconnect the flexible card wire from the connector CN5 on the HN-224 board.

### 3. Full-top sensor removal

Remove the screw, then remove the full-top sensor while disconnecting the connector.

**Note**

Be careful not to damage the drum when removing the full-top sensor.

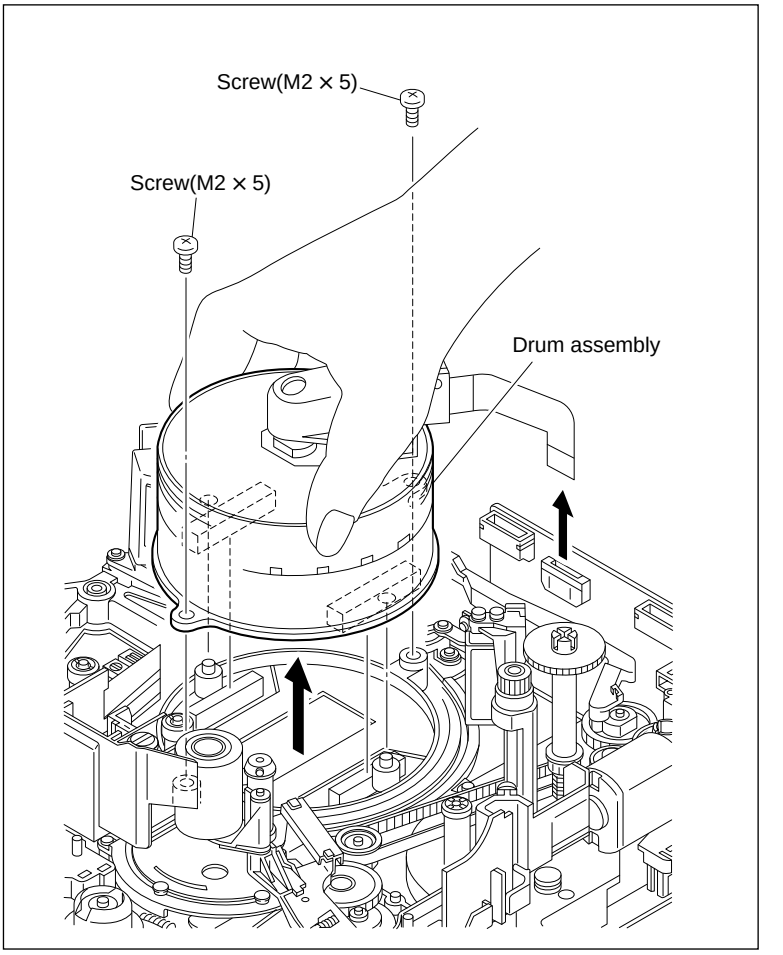



### 4. Drum assembly removal

Remove the two screws, then remove the drum assembly in the vertical direction.

**Note**

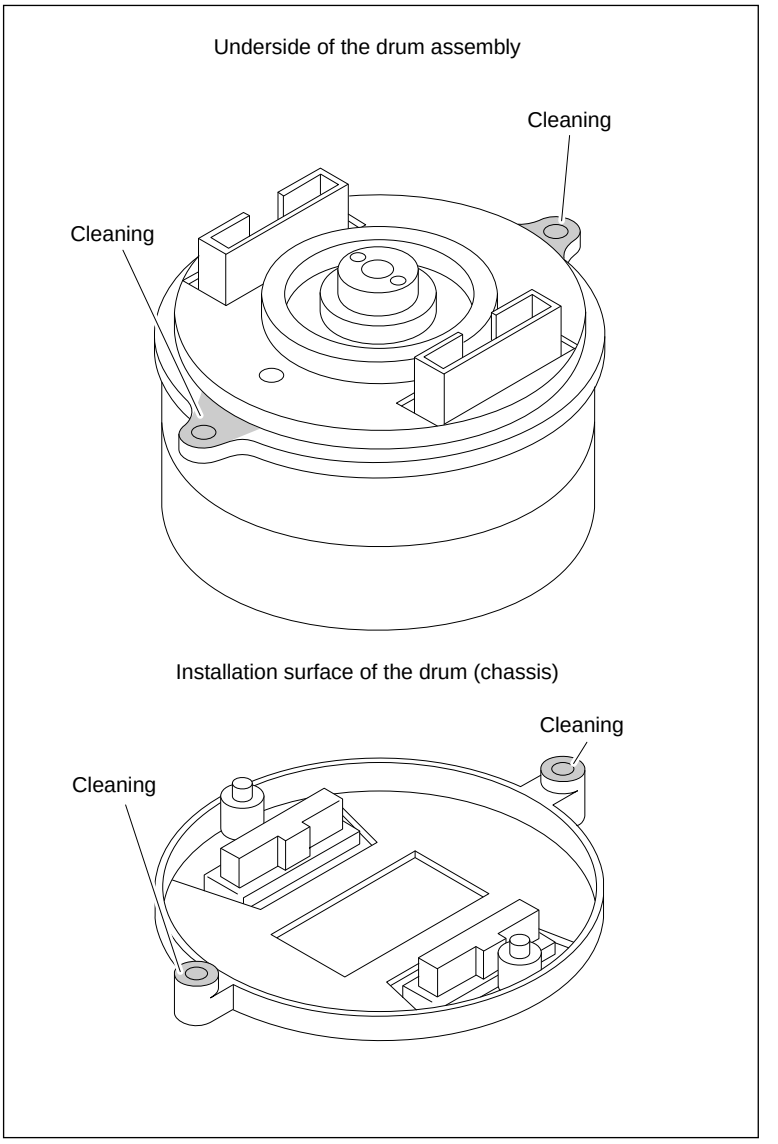
- The drum assembly is installed in the mechanical deck by two screws. And it is connected to the two connectors on the underside of mechanical deck. Therefore, do not apply excessive force to the drum assembly even after the screws are removed.
- Be careful not to damage the CTL head, TC head, and peripheral tape guide when removing the drum assembly.



## Installation

### 5. Installation surface cleaning

Clean the installation surfaces of a new drum assembly and chassis with cleaning cloth moistened with cleaning fluid.



### 6. Drum assembly installation

(1) Align the two positioning holes of a new drum assembly with the positioning pins shown in the figure and put the drum assembly on the mechanical deck.

**Note**

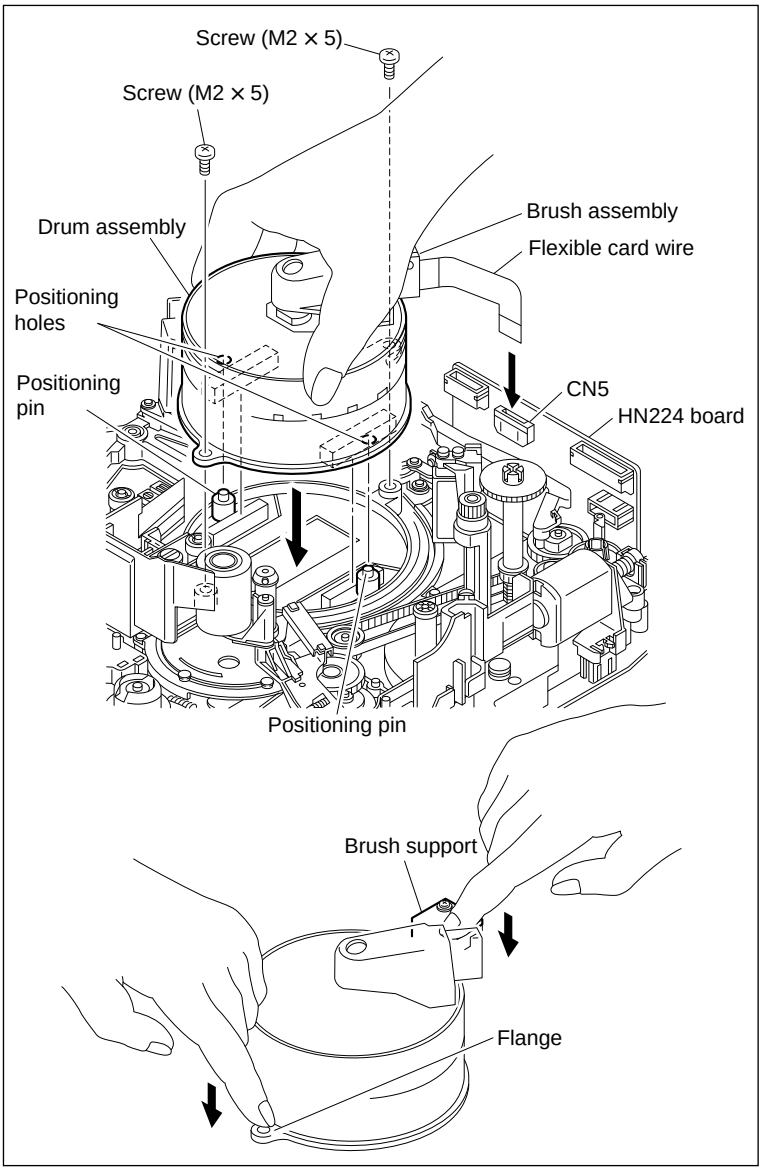
- Hold a new drum assembly keeping away from the video head during installation.
- Take care that the drum assembly does not touch the CTL head, TC head, and peripheral tape guide.

(2) Push the flange and drum support of the drum assembly with fingers and then connect the connector of the drum into the connectors on the MDR-1 board.

(3) Tighten the two screws.
[Tightening torque:
$20 \times 10^{-2}$ N•m (2 kgf•cm)]

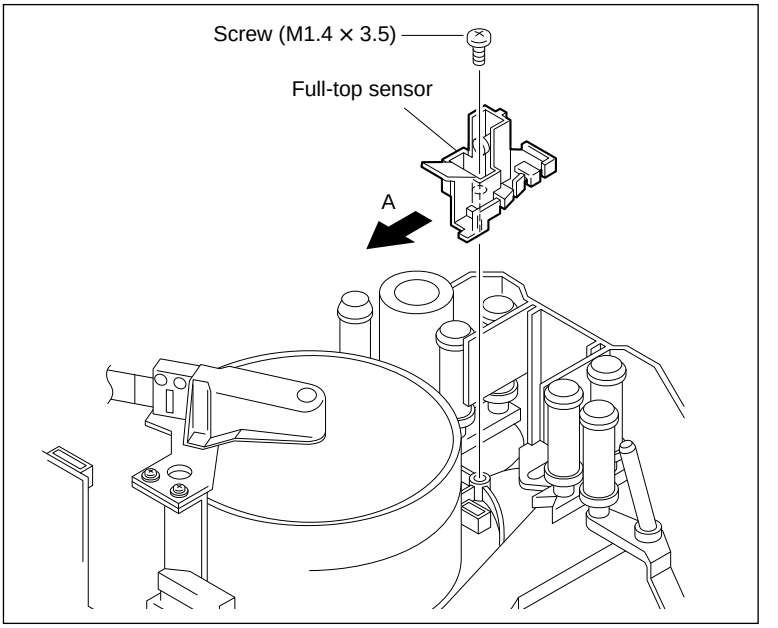
**Note**

Pushing the brush support in the slanting direction, may cause a brush to be disengaged.




### 7. Full-top sensor installation

Insert the connector of the full-top sensor.
Push the full-top sensor in the direction A until the tip of the full-top sensor will go to the surface of the lower drum.
After that, fix the full-top sensor with one screw.




### 8. Brush assembly connector connection

Connect the flexible card wire of the brush assembly to the connector CN5 on the HN-224 board.

### 9. VH cleaner installation

Pass the VH cleaner through the pin and hook the spring. Connect the connector disconnected in step 1 to the connector CN2 on the HN-224 board.

### 10. Head and tape running surface cleaning

Clean the portion below with cleaning cloth moistened with cleaning fluid.
(DNV-5: Refer to section 5-1-2 and 5-1-3 in Part 1 of the Maintenance Manual.)
(DNW-7/7P/90/90P/90WS/90WSP: Refer to section 6-1-2 and 6-1-3 in Part 1 of the Maintenance Manual.)

- Video head
- Upper drum tape running surface
- Lower drum lead and tape running surface

**Note**

After cleaning, wipe with dry cloth.

---

**Adjustment after replacement**

### 11. Tape running adjustment

(Refer to section 4-2-1.)

### 12. Video tracking adjustment

(Refer to section 4-2-2.)

### 13. CTL head height confirmation

(Refer to section 4-2-3.)

### 14. CTL head position adjustment

(Refer to section 4-2-4.)

### 15. TC head height confirmation

(Refer to section 4-2-5.)

### 16. TC head position adjustment

(Refer to section 4-2-6.)

### 17. Automatic PG phase adjustment

(Refer to section 7-3-2.)

### 18. Servo automatic adjustment

(Refer to section 7-3-1.)

### 19. Video system adjustment (equalizer)

(Refer to section 7-8.)

## 3-2-5. VH Cleaner Assembly Replacement

### Outline

**Replacement**

Mode setting
VH cleaner assembly removal
VH cleaner assembly installation
Operation confirmation

### Precaution

Be careful not to touch the video head when the VH cleaner assembly is replaced.
The adjustment after the VH cleaner assembly is replaced is not required.

### Preparations

1. Turn off the power.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

The VH cleaner assembly can be replaced with the cassette compartment installed in the unit.

### Removal

**1. Mode setting**

Put the unit into the unthreading end state.
(Refer to section 3-1-3.)

**2. VH cleaner assembly removal**

(1) Turn the upper drum assembly with fingers so that the video head is not positioned near the cleaning roller.
(2) Disconnect connector CN2 on the HN-224 board.

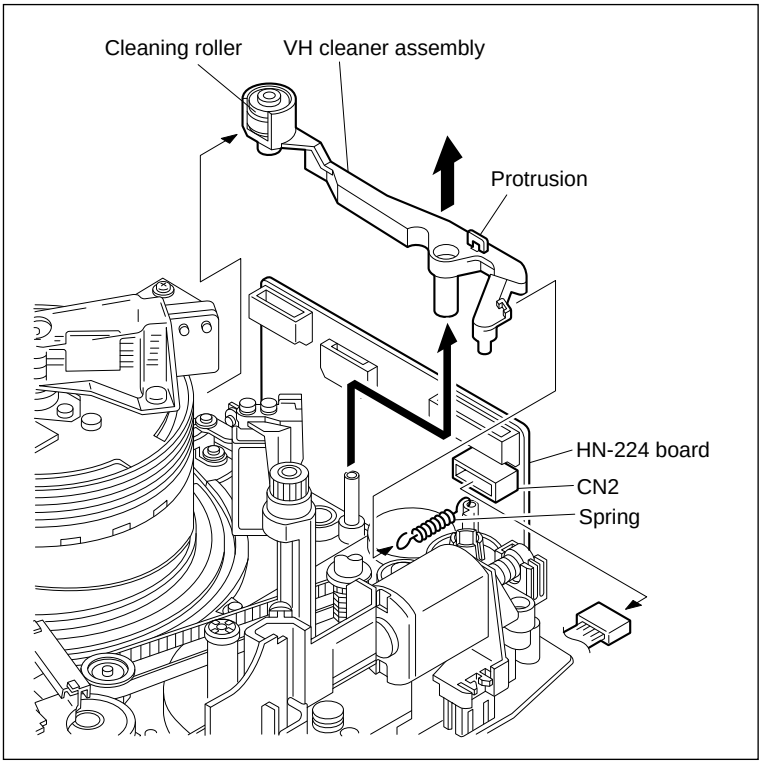
**Note**

At that time disconnect the connector, not to exert a force on the TC head assembly.

(3) Remove the screw shown in the figure, hold the protrusion of the VH cleaner using tweezers, and remove the VH cleaner from the unit.

**Note**

Take care that the tweezers and VH cleaner assembly do not touch the upper drum assembly and drum assembly during removal.



## Installation

### 3. VH cleaner installation

Pass the VH cleaner assembly through the pin and hang the spring. Connect the connector disconnected in step 2 to connector CN2 on the HN-224 board.

**Note**

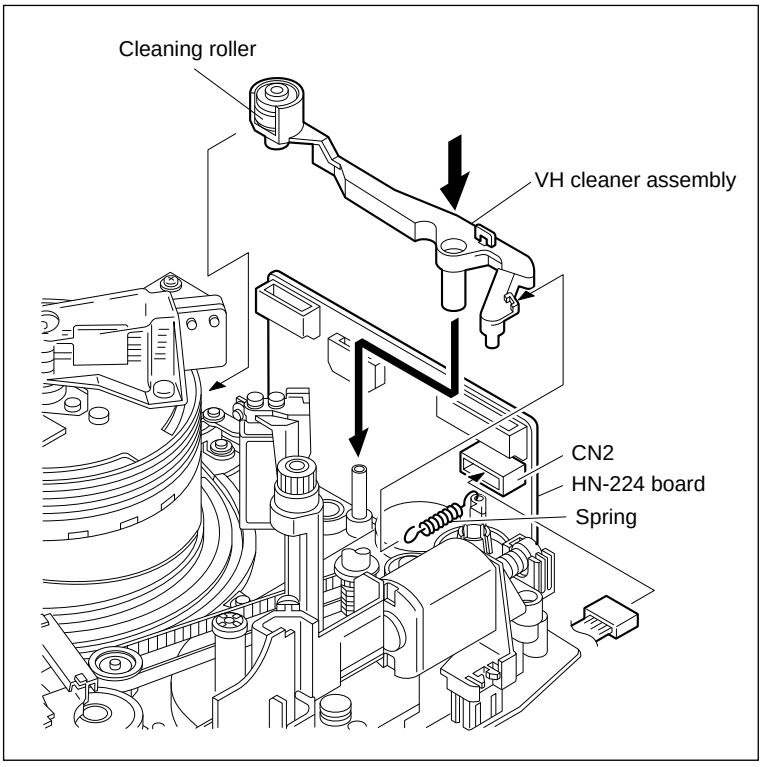
Never touch the cleaning roller of a new VH cleaner assembly.

### 4. Operation confirmation

Confirm that the VH cleaner assembly is released from or touches the drum when the warm wheel of the manual eject assembly is turned clockwise and counterclockwise.

**Note**

Do not turn the warm wheel more than required. This may damage the unit.



## 3-2-6. Pinch Roller Replacement

### Outline

#### Replacement

Pinch roller removal
Installation shaft cleaner
Pinch roller installation
Pinch roller cleaning

#### Adjustment after replacement

Tape running adjustment
TC head height confirmation

### Precaution

If a pinch roller is worn, replace only the pinch roller. Make sure the wearing of gloves when replacing the pinch roller.

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

The pinch roller can be replaced with the cassette compartment installed in the unit.

### Tools

- Torque screwdriver bit (for M1.4) J-6325-110-A
- Torque screwdriver (for 3 kg) J-6325-400-A
- Cleaning cloth 3-184-527-01
- Cleaning fluid 9-919-573-01

## Removal

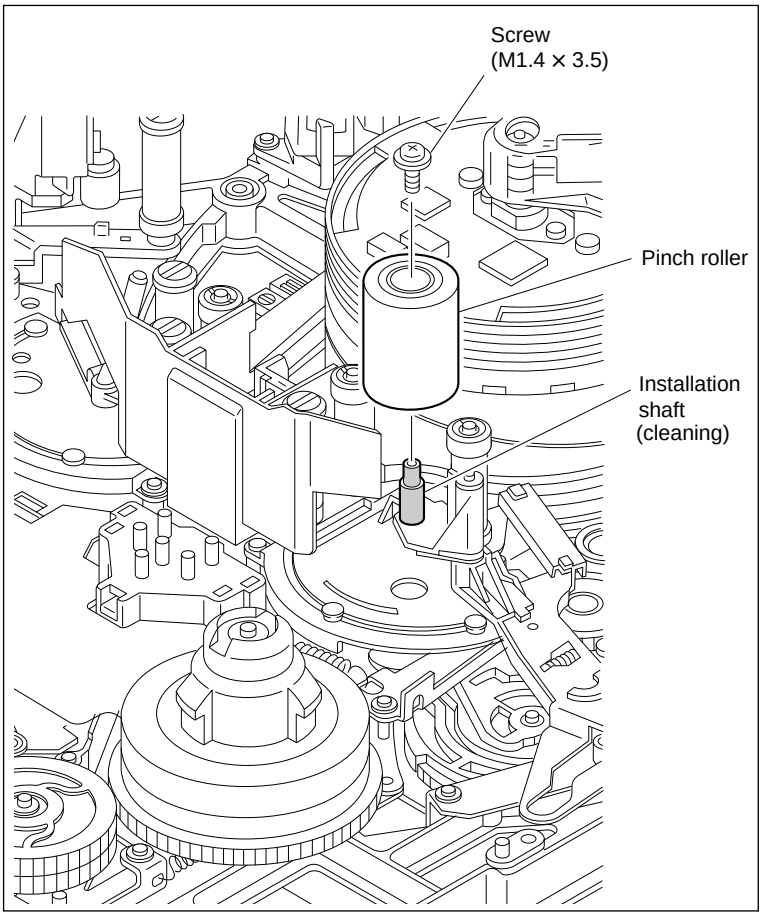
### 1. Pinch roller removal

(1) Loosen the screw in the center of the pinch roller, raise the pinch roller just upward, and remove it.

**Note**

At that time loosen the screw, not to push it firmly by the driver.
Turn the driver while supporting the pinch roller by hand.

(2) Remove the screw from the pinch roller.




## Installation

### 2. Installation shaft cleaning

Clean the installation shaft of the pinch roller with cleaning cloth moistened with cleaning fluid.

### 3. Pinch roller installation

Install the pinch roller in the installation shaft of the pinch roller and tighten the screw removed in step 1.
[Tightening torque: $9 \times 10^{-2}$ N•m (0.9 kgf•cm)]

**Notes**

- Never touch the surface of the pinch roller with bare hands.
- The pinch roller has no right-side up.

### 4. Pinch roller cleaning

Clean the surface of the pinch roller with cleaning cloth moistened with cleaning fluid.

## Adjustment after replacement

### 5. Tape running adjustment

(Refer to section 4-2-4.)

### 6. TC head height confirmation

(Refer to section 4-2-5.)

## 3-2-7. Tension Regulator Band Assembly Replacement

### Outline

#### Replacement

Tension regulator band assembly removal
Reel table cleaning
Tension regulator band assembly installation

#### Adjustment after replacement

Tension regulator operating position adjustment
FWD back tension adjustment
Tape running confirmation

### Precaution

Replace the tension regulator band assembly itself if the felt surface of the tension regulator band assembly is hardened or worn.

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
4. Remove the cassette compartment.
   (Refer to section 3-3-24.)

**Note**

Stop washers are used for installation of the tension regulator band assembly. Do not reuse them. Install the new ones (3-559-408-11) when replacing the tension regulator band assembly.

### Tools

- Stop washer fastening tool J-6323-530-A
- Cleaning cloth 3-184-527-01
- Cleaning fluid 9-919-573-01

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## Removal

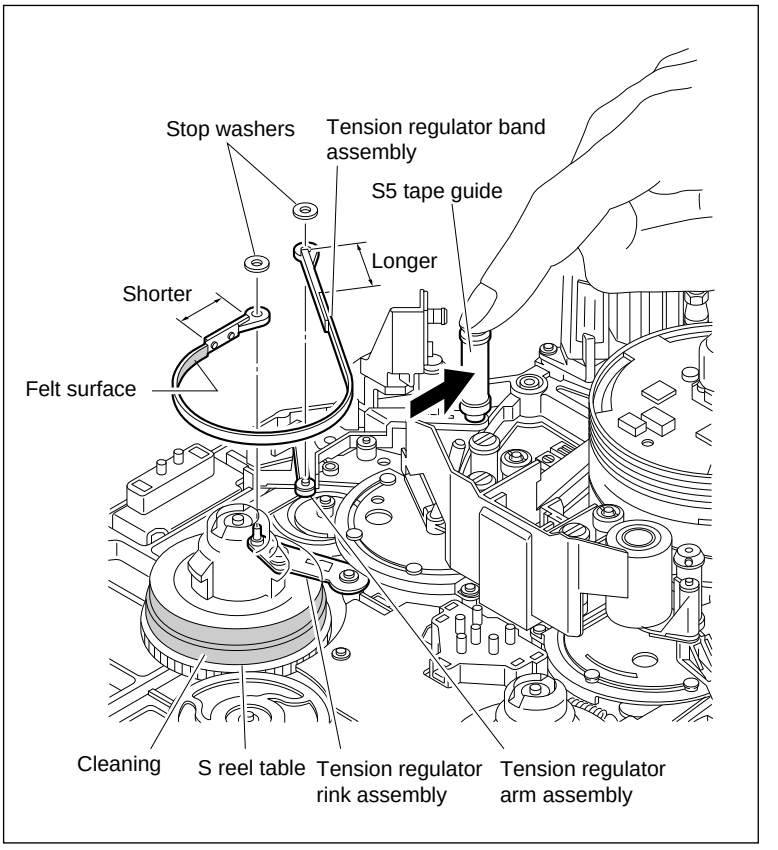
### 1. Tension regulator band assembly removal

(1) Remove the two stop washers of the tension regulator band assembly.

**Note**

Do not apply excessive force to the tension regulator arm assembly and tension regulator rink assembly when the stop washers are removed.

(2) Move the S5 tape guide of the tension regulator in the direction indicated by the arrow and remove the tension regulator band assembly.




## Installation

### 2. S reel table cleaning

Clean the brake band contact surface of the S reel table with cleaning cloth moistened with cleaning fluid.

### 3. Tension regulator band assembly installation

(1) Install a new tension regulator band assembly in the shafts of the tension regulator arm assembly and tension regulator rink assembly with the felt surface put inside. The tension regulator band assembly shall be installed in the direction described below.
Longer band hook: Installed in the shaft of the tension regulator arm assembly.
Shorter band hook: Installed in the shaft of the tension regulator link assembly

**Note**

- Be careful not to bend the tension regulator band assembly during installation. This may damage the tension regulator band assembly.
- Do not touch the felt surface of the tension regulator band assembly with fingers. Do not make oil adhere to the felt surface.

(2) Install the two stop washers while holding the arms of the tension regulator arm assembly and tension regulator rink assembly using a screwdriver.

**Note**

Do not apply excessive force to the tension regulator arm assembly and tension regulator rink assembly when the stop washers are installed.

## Adjustment after replacement

### 4. Tension regulator operating position adjustment

(Refer to section 4-1-2.)

### 5. FWD back tension adjustment

(Refer to section 4-1-3.)

### 6. Tape running confirmation

(Refer to section 4-2-1.)

## 3-2-8. Reel Drive Gear Assembly Replacement

### Outline

#### Replacement

Blind panel removal
Timing belt (reel) removal
S soft brake assembly removal
Reel drive gear assembly removal
Reel drive gear assembly installation
Timing belt (reel) installation

#### Adjustment after replacement

Belt tension adjustment

### Preparations

1. Turn off the power.
2. Remove the front lid, inside panel, and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
3. Remove the cassette compartment.
   (Refer to section 3-3-24.)
4. Remove the plug-in boards.
   (Refer to section 1-8 in Part 1 of the Maintenance Manual.)

**Note**

The reel drive gear assembly can be replaced with the mechanical deck assembly installed in the unit.

### Tools

- Torque screwdriver bit (for M1.4) J-6325-110-A
- Torque screwdriver bit (for M2) J-6325-380-A
- Torque screwdriver (for 3 kg) J-6325-400-A

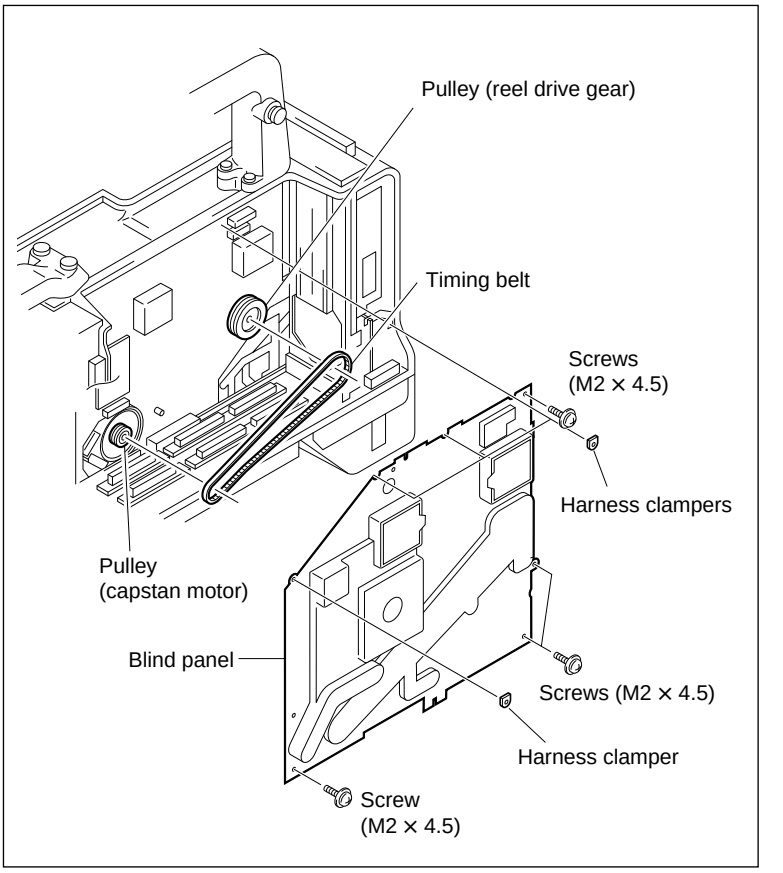
## Removal

### 1. Blind panel removal

(1) Remove the four rubbers for harness clamping from the blind panel.
(2) Remove the eight screws, then remove the blind panel from the unit.

### 2. Timing belt (reel) removal

Remove the timing belt from the pulleys of the reel drive gear assembly and capstan motor.

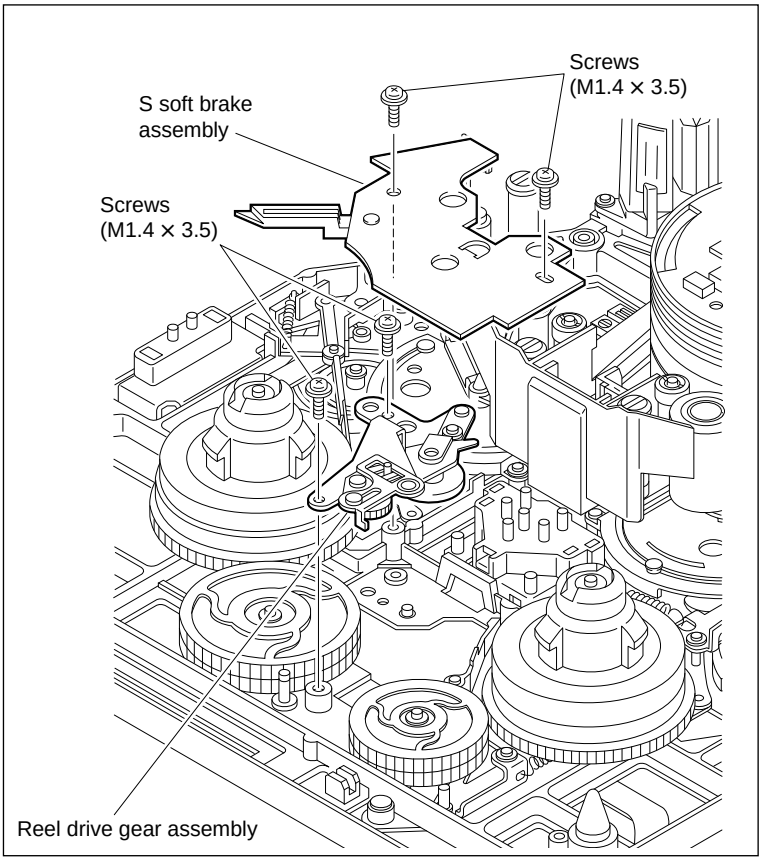



### 3. S soft brake assembly removal

Remove the two screws, then remove the S soft brake assembly.

### 4. Reel drive gear assembly removal

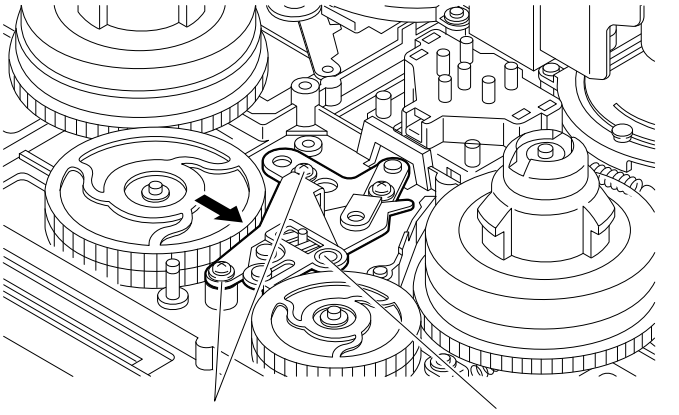
Remove the two screws, then remove the reel drive gear assembly.



## Installation

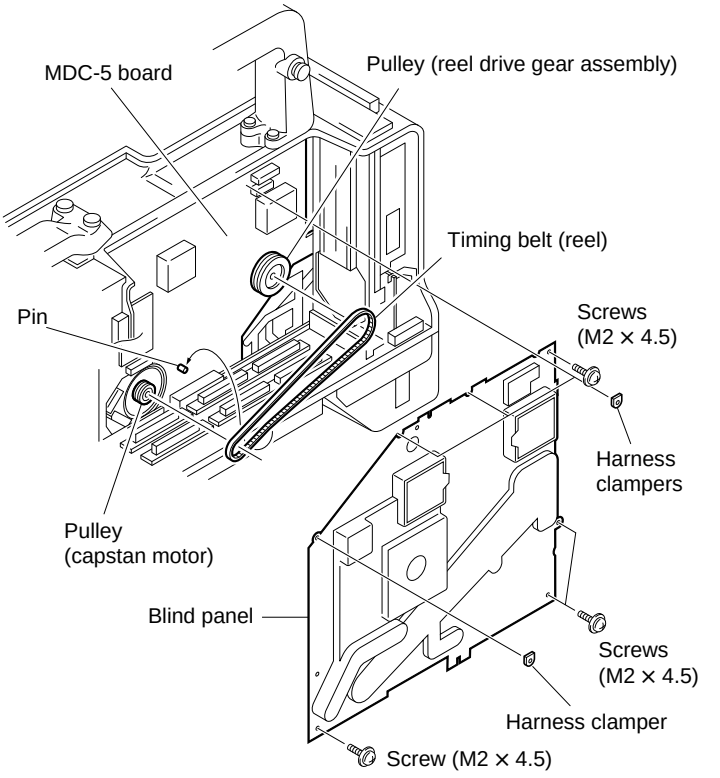
### 5. Reel drive gear assembly installation

(1) Temporarily attach a new reel drive gear assembly with two screws.
(2) Tighten the preceding screws to required torque while pressing the reel drive gear assembly in the direction of the arrow.
[Tightening torque:
$9 \times 10^{-2}$ N•m (0.9 kgf•cm)]




### 6. Timing belt (reel) installation

(1) Install the timing belt around the pulleys of the reel drive gear assembly and capstan motor.
(2) Hang the timing belt on the pin on the MDC-5 board as shown in the figure.




## Adjustment after replacement

### 7. Belt tension adjustment

(Refer to section 4-1-5.)

### 8. S soft brake assembly installation

Install the S soft brake assembly with two screws.

### 9. Blind panel installation

(1) Install the blind panel with eight screws.
(2) Install the four rubbers for harness clamping.

# 3-3. Replacement of Main Parts

## 3-3-1. T Soft Brake Assembly Replacement

### Outline

#### Replacement

T soft brake assembly removal
T reel table cleaning
T soft brake assembly installation

#### Adjustment after replacement

Brake torque confirmation

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
4. Remove the cassette compartment.
   (Refer to section 3-3-24.)

**Note**

A stop washer is used for installation of the T soft brake assembly. Do not reuse it. Install the new one (3-559-408-11) when replacing the T soft brake assembly.

### Tools

- Stop washer fastening tool J-6323-530-A
- Cleaning cloth 3-184-527-01
- Cleaning fluid 9-919-573-01

## Removal

### 1. T soft brake assembly removal

(1) Remove the stop washer.
(2) Unhook the tension coil spring and remove the T soft brake assembly.

## Installation

### 2. T reel table cleaning

Clean the brake contact surface of the T reel table with cleaning cloth moistened with cleaning fluid.

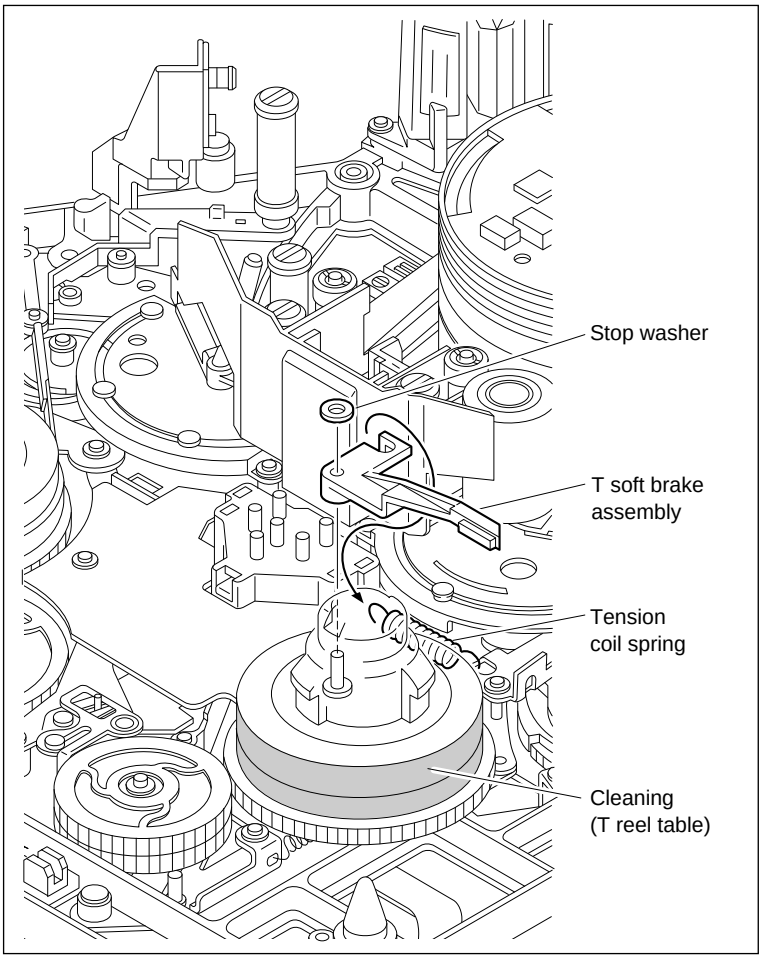
### 3. T soft brake assembly installation

(1) Install a new T soft brake assembly and hang the tension coil spring.
(2) Install the stop washer.

## Adjustment after replacement

### 4. Brake torque confirmation

(Refer to section 4-1-4.)



## 3-3-2. S/T Idler Assembly Replacement

### Outline

#### Replacement

S or T idler assembly removal
Installation shaft cleaning
S or T idler assembly installation

### Precaution

The S idler assembly and T idler assembly differ in parts, but replacement procedures are almost the same for them.
The adjustment after replacement is not required. However, confirm the operation such as PLAY, F.FWD, and REW.

### Preparations

1. Turn off the power.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
3. Remove the cassette compartment.
   (Refer to section 3-3-24.)

**Note**

Stop washers are used for installation of the S and T idler assemblies. Do not reuse them. Install the new ones (3-559-408-11) when replacing the S and/or T idler assembly.

### Tools

- Torque screwdriver bit (for M1.4) J-6325-110-A
- Torque screwdriver (for 3 kg) J-6325-400-A
- Stop washer fastening tool J-6323-530-A
- Cleaning cloth 3-184-527-01
- Cleaning fluid 9-919-573-01
- Oil 7-661-018-18

## Removal

### 1. S or T Idler assembly Removal

Remove the stop washer, then remove the S or T idler assembly.

**Note**

Do not remove and lose the polywashers at the bottom of the S or T idler assembly and the top of the S idler assembly from their installation shaft. The polywashers may be missing with the idler assembly removed.

## Installation

### 2. Installation shaft cleaning

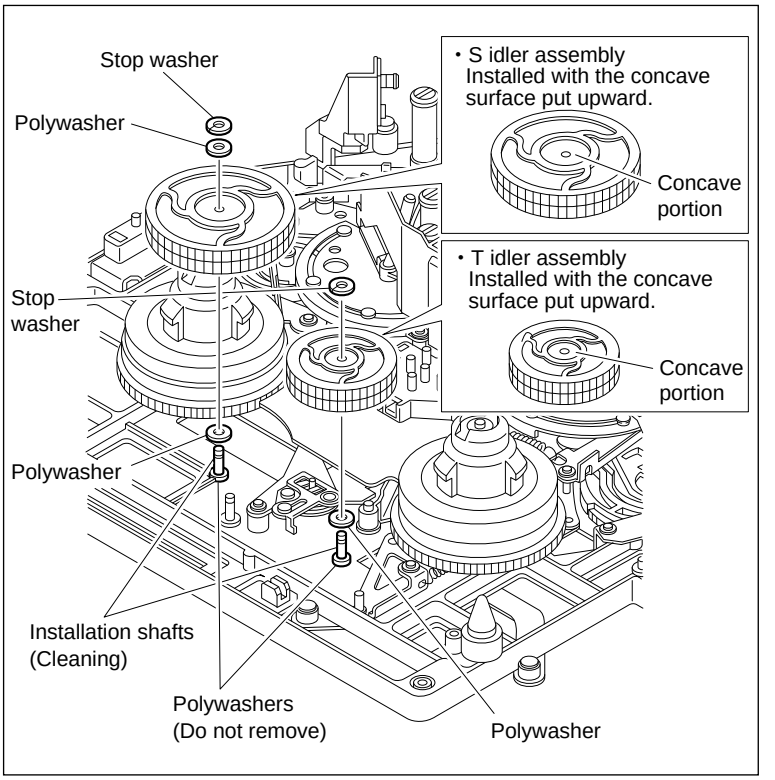
Clean the installation shaft with cleaning cloth moistened with cleaning fluid.

### 3. S or T idler assembly installation

(1) Apply a 1/4 drop of oil onto the installation shaft thinly.

(2) Insert a new S or T idler assembly into the installation shaft.
The idler assembly shall be installed in the direction described below.
S idler assembly: Installed with the concave surface put upward.
T idler assembly: Installed with the concave surface put upward.

(3) Install the stop washer.



## 3-3-3. Timing Belt (Reel) Replacement

### Outline

#### Replacement

Blind panel removal
Timing belt (reel) removal
Pulley cleaning
Timing belt (reel) installation
Blind panel installation

#### Adjustment after replacement

Belt tension adjustment

### Preparations

1. Turn off the power.
2. Remove the front lid, inside panel, and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
3. Remove the cassette compartment.
   (Refer to section 3-3-24.)
4. Remove the plug-in boards.
   (Refer to section 1-8 in Part 1 of the Maintenance Manual.)

**Note**

The timing belt (reel) can be replaced with the mechanical deck assembly installed in the unit.

### Tools

- Torque screwdriver bit (for M1.4) J-6325-110-A
- Torque screwdriver bit (for M2) J-6325-380-A
- Torque screwdriver (for 3 kg) J-6325-400-A

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## Removal

### 1. Blind panel removal

(1) Remove the four rubbers for harness clamping from the blind panel.
(2) Remove the eight screws, then remove the blind panel from the unit.

### 2. Timing belt (reel) removal

Remove the timing belt from the pulleys of the reel drive gear assembly and capstan motor.

## Installation

### 3. Pulley cleaning

Clean the pulleys of the reel drive gear assembly and capstan motor with cleaning cloth moistened with cleaning fluid.

### 4. Timing belt (reel) installation

(1) Install a new timing belt around the pulleys of the reel drive gear assembly and capstan motor.
(2) Hang the timing belt on the pin on the MDC-5 board as shown in the figure.

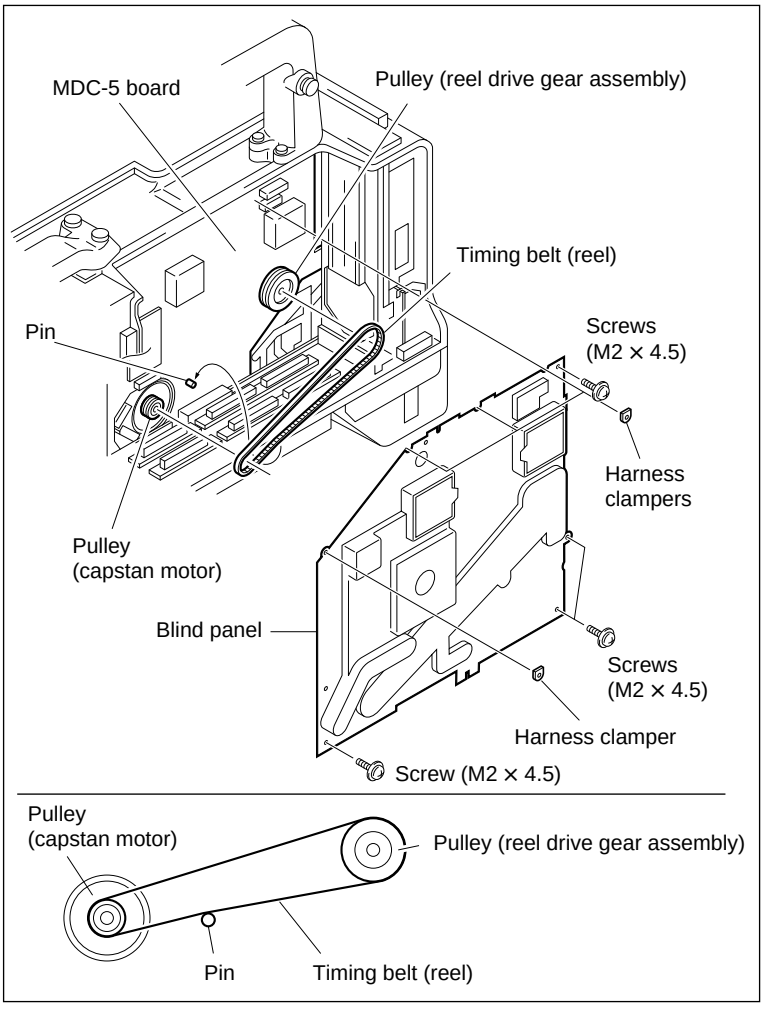
## Adjustment after replacement

### 5. Belt tension adjustment

(Refer to section 4-1-5.)

### 6. Blind panel installation

(1) Install the blind panel with eight screws.
(2) Install the four rubbers for harness clamping.



## 3-3-4. Timing Belt (Threading) Replacement

### Outline

#### Replacement

TC head assembly removal
Manual eject drive removal
VH cleaner assembly removal
Pulley gear (B) removal
Timing belt (threading) removal
Timing belt (threading) installation
Pulley gear (B) installation
VH cleaner assembly installation
Manual eject drive installation
TC head assembly installation

#### Adjustment after replacement

Operation confirmation
TC head position check

### Preparations

1. Turn off the power.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

Stop washers are used for installing each gear of the gear block assembly. Use a new stop washer (3-559-408-11) when replacing each gear of the gear block assembly.

### Tools

- Stop washer insertion tool J-6323-530-A
- Torque screwdriver bit (for M2) J-6325-380-A
- Torque screwdriver (for 3 kg) J-6325-400-A

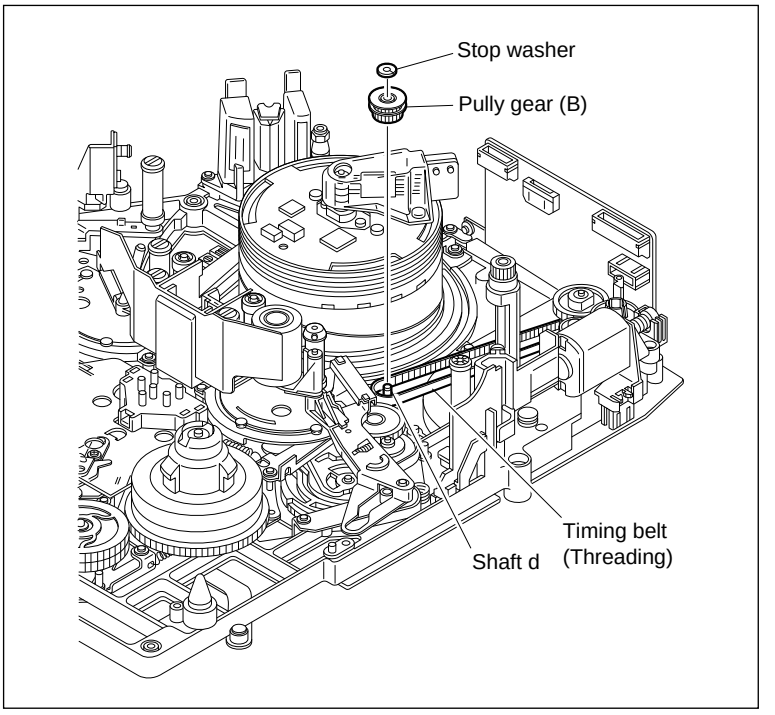
## Removal

### 1. TC head assembly removal
(Refer to section 3-3-7.)

### 2. Manual eject drive removal
(Refer to section 3-3-13.)

### 3. VH cleaner assembly removal
(Refer to section 3-2-5.)

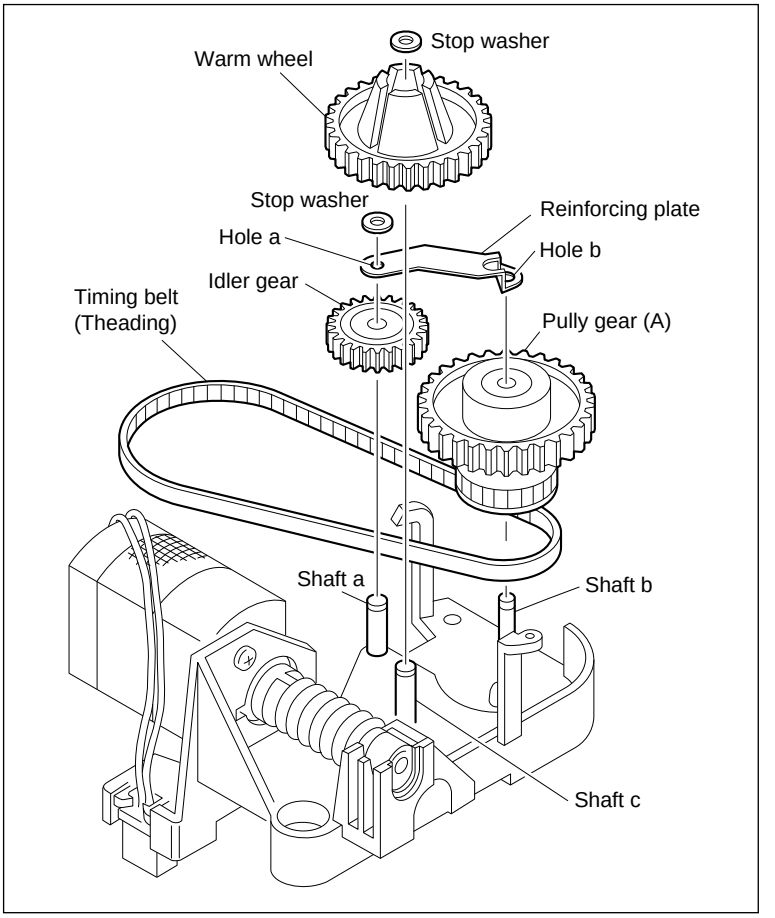
### 4. Pulley gear (B) removal
Remove the stop washer, then remove the pulley gear (B).



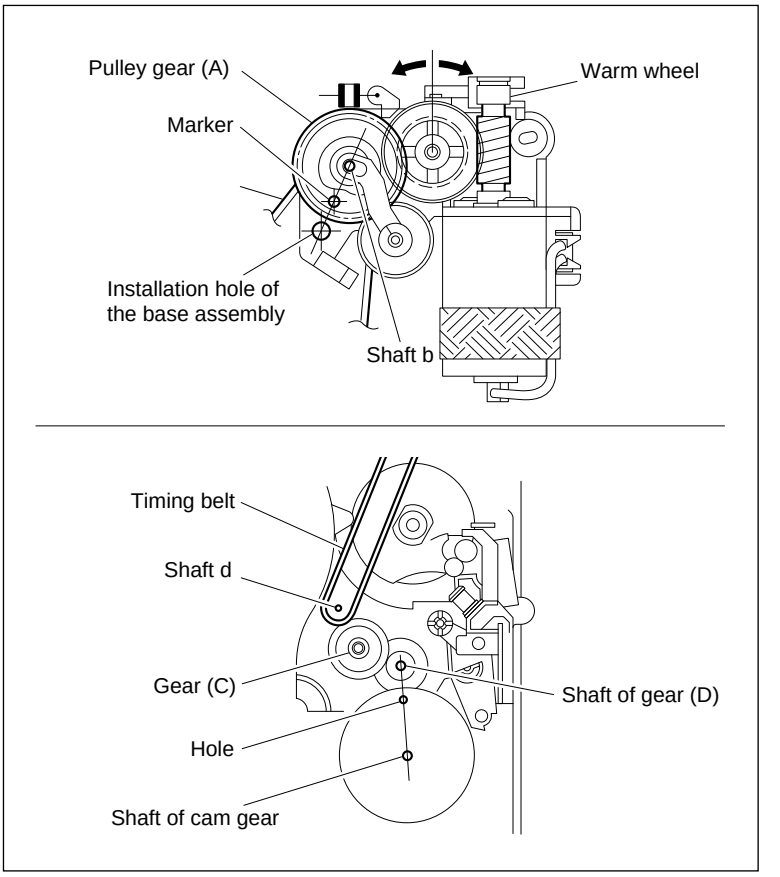

### 5. Timing belt (threading) removal
(1) Remove the stop washer, then remove the warm wheel.
(2) Remove the stop washer and reinforcing plate, then remove the idler gear.
(3) Remove the pulley gear (A), then remove the timing belt (threading).

## Installation

### 6. Timing belt (threading) installation
(1) Hook the timing belt (threading) on the pulley gear (A) and install the pulley gear (A) on the shaft “b”.
(2) Install the idler gear on the shaft “a”.
(3) Hook the hole “b” of the reinforcing plate on the shaft “b” and pass the shaft “a” through the hole “a”, and install it with a stop washer.
(4) Put the warm wheel onto the shaft “c” and install it with a stop washer.

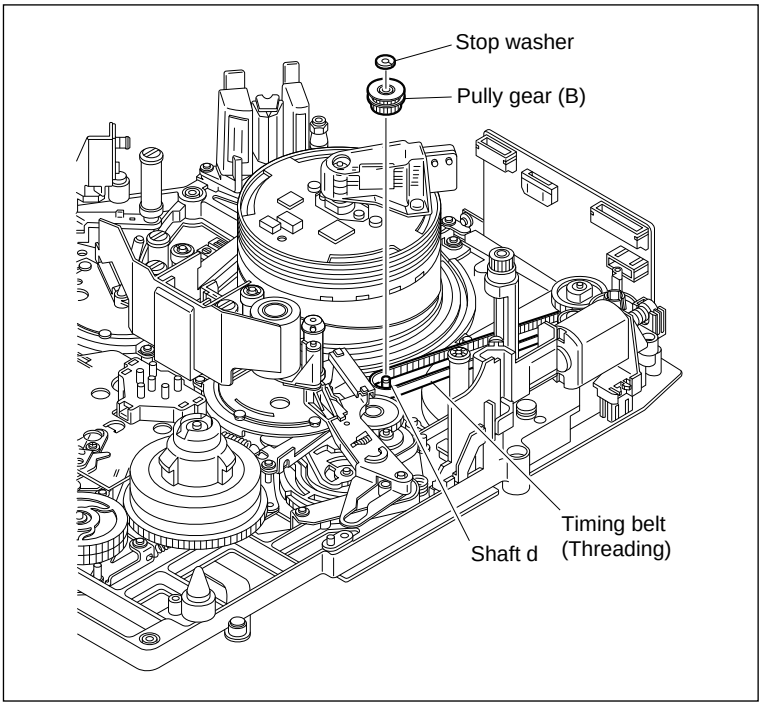


(5) Turn the warm wheel for phase adjustment so that the marker on the pulley gear (A) is located in a straight line with the installation hole and shaft “b” of the motor base assembly.
(6) Turn the gear (C) for phase adjustment so that the hole of the cam gear is located in a straight line with the shafts of gear (D) and cam gear.




### 7. Pulley gear (B) installation

Hook the timing belt (threading) on the pulley gear (B). Put the pulley gear (B) with timing belt on the shaft d while keeping the states in steps (5) and (6) in procedure 6.




### 8. VH cleaner assembly installation

(Refer to section 3-2-5.)

### 9. Manual eject drive installation

(Refer to section 3-3-13.)

### 10. TC head assembly installation

(Refer to section 3-3-7.)

## 3-3-5. Capstan Motor Replacement

### Outline

#### Replacement

Timing belt (reel) removal
Capstan motor removal
Capstan motor installation
Capstan motor shaft and pulley cleaning
Timing belt (reel) installation
Manual eject gear operation confirmation

#### Adjustment after replacement

Belt tension adjustment
Tape running confirmation
Servo automatic adjustment

### Preparations

1. Turn off the power.
2. Remove the front lid, inside panel, and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
3. Remove the cassette compartment.
   (Refer to section 3-3-24.)
4. Remove the plug-in boards.
   (Refer to section 1-8 in Part 1 of the Maintenance Manual.)
5. Remove the blind panel.
   (Refer to section 3-2-8.)

**Note**

The capstan motor can be replaced with the mechanical deck assembly installed in the unit.

### Tools

- Torque screwdriver bit (for M2) J-6325-380-A
- Torque screwdriver bit (for M1.4) J-6325-110-A
- Torque screwdriver (for 3 kg) J-6325-400-A
- Cleaning cloth 3-184-527-01
- Cleaning fluid 9-919-573-01

## Removal

### 1. Timing belt (reel) removal

Remove the timing belt from the pulleys of the reel drive gear assembly and capstan motor.

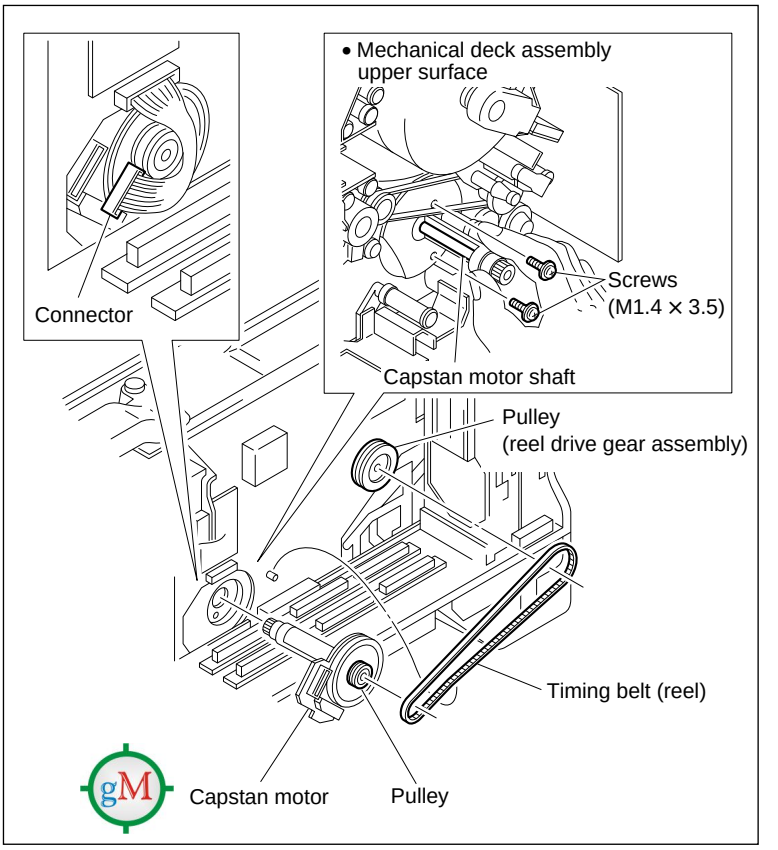
### 2. Capstan motor removal

(1) Disconnect the connector connected to the capstan motor board.

(2) Remove the two screws securing the capstan motor from above of the mechanical deck assembly while holding it by hand, then remove the motor from the back of the mechanical deck assembly.

**Note**

Be careful not to fall the capstan motor.




## Installation

### 3. Capstan motor installation

(1) Pass a new capstan motor through the hole of the mechanical deck assembly as shown in the figure and tighten the two screws.
[Tightening torque:
$9 \times 10^{-2}$ N•m (0.9 kgf•cm)]

**Note**

Be careful not to damage the capstan motor shaft when passing the capstan motor through the hole of the mechanical deck assembly.

(2) Connect a connector to the capstan motor board.

**Note**

Remember to connect this connector.

### 4. Pulley cleaning

Clean the pulleys of the reel drive gear assembly and capstan motor with cleaning cloth moistened with cleaning fluid.

### 5. Capstan motor shaft cleaning

Clean the capstan motor shaft with cleaning cloth moistened with cleaning fluid.

**Note**

After cleaning, wipe the capstan motor shaft with dry cloth.

### 6. Timing belt (reel) installation

(1) Install the timing belt around the pulleys of the reel drive gear assembly and capstan motor.
(2) Hang the timing belt on the pin on the MDC-5 board as shown in the figure.
(See illustration on the previous page.)

### 7. Manual eject gear operation confirmation

Turn the warm wheel of the manual eject assembly and confirm that the unit is smoothly put into the threading/unthreading state.
(Refer to section 3-1-4.)

**Note**

Do not turn the warm wheel more than required. This may damage the unit.

---

**Adjustment after replacement**

### 8. Belt tension adjustment

(Refer to section 4-1-5.)

### 9. Tape running confirmation

(Refer to section 4-2-1.)

### 10. Servo automatic adjustment

(Refer to section 7-3-1.)

## 3-3-6. CTL Head Replacement

### Outline

#### Replacement

CTL/FE head assembly removal
CTL head replacement
CTL/FE head assembly installation
CTL/FE head assembly cleaning

#### Adjustment after replacement

Tape running confirmation
Video tracking adjustment
CTL head height adjustment
CTL head position adjustment
TC head position adjustment

**CAUTION**

Never touch the tape cleaner on the entrance head block with bare heads.
The tape cleaner has a sharp edge. Extreme caution should be taken when replacing or adjusting the CTL head.

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

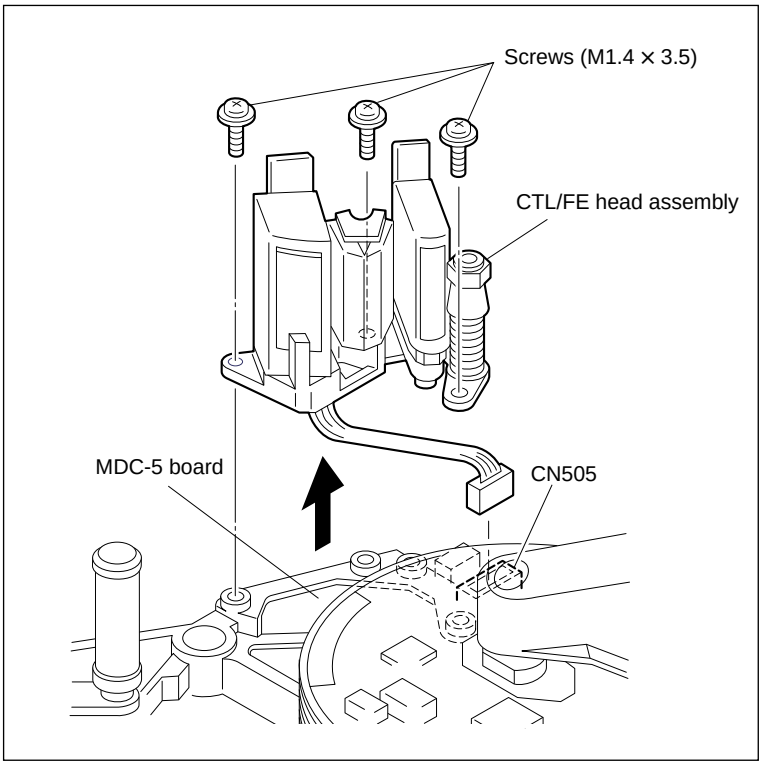
### Tools

- Torque screwdriver bit (for M2) J-6325-380-A
- Torque screwdriver (for 3 kg) J-6325-400-A
- Cleaning cloth 3-184-527-01
- Cleaning fluid 9-919-573-01

## Removal

### 1. CTL/FE head assembly removal

(1) Disconnect connector CN505 on the MDC-5 board.
(2) Remove the three screws, then remove the CTL/FE head assembly from the unit.

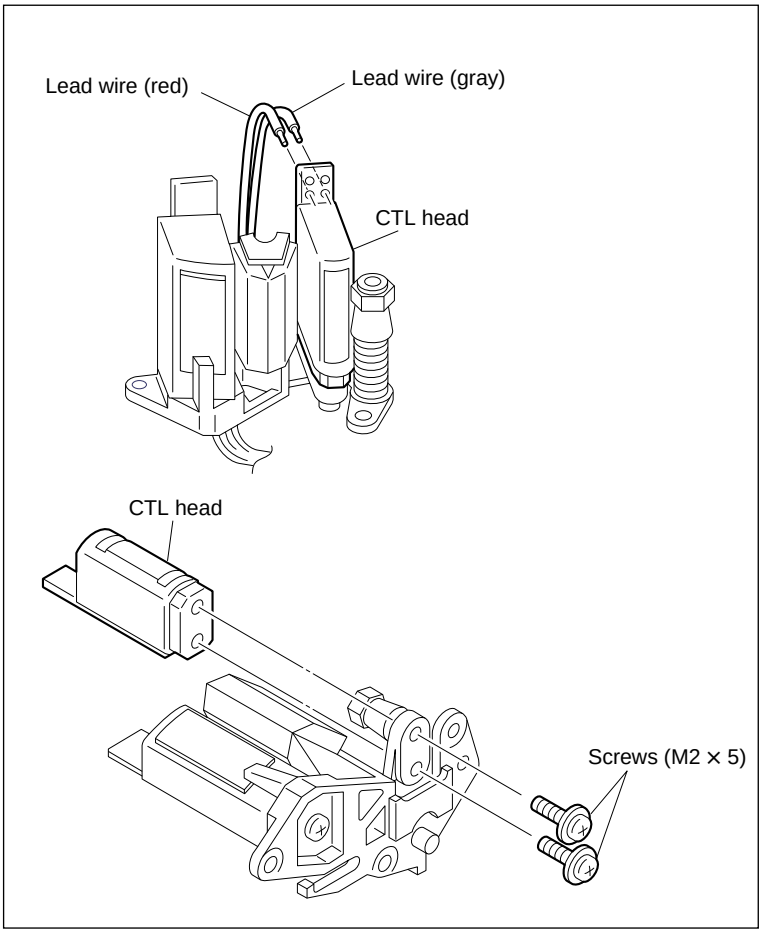



**Note**

Take a great care that the screwdriver does not damage the video head, drum, erase head, tape guide, and other parts.

### 2. CTL head replacement

(1) Desolder the two lead wires connected to the CTL head.
(2) Remove the two screws at the back of the CTL head, then remove the CTL head.
(3) After cleaning a contact surface of a new CTL head, install it with two screws.
(4) Solder the two lead wires to the printed circuit board of the CTL head.
(Refer to step (1) in procedure 2.)




**Note**

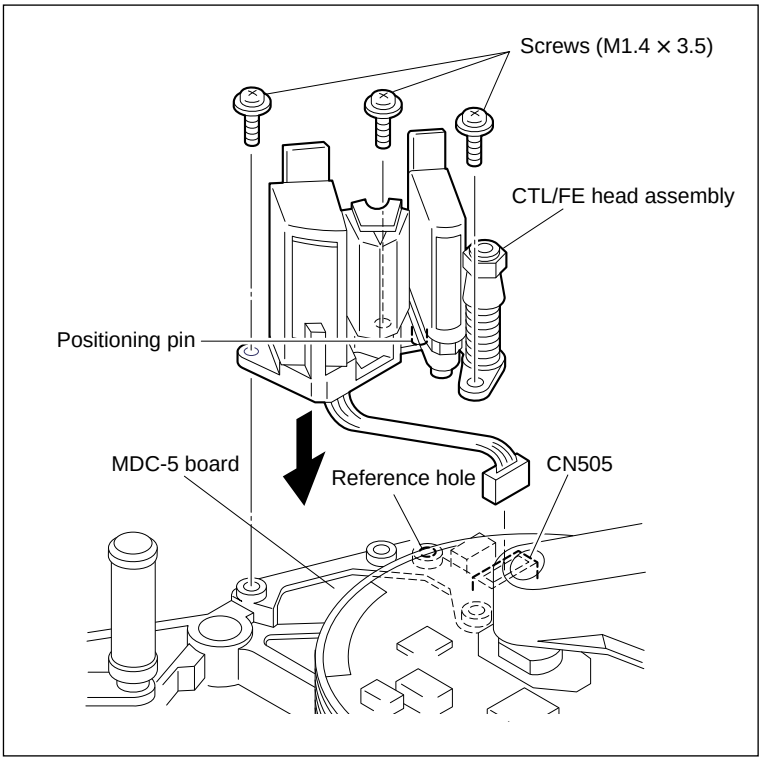
Connect the lead wires to their right destinations with attention to the color of wires. Improper connection causes a serious trouble to the tape compatibility.

## Installation

### 3. CTL/FE head assembly installation

(1) Put the positioning pin of the CTL/FE head assembly into the reference hole of the chassis and install it with three screws. [Tightening torque: $9 \times 10^{-2}$ N•m (0.9 kgf•cm)]

(2) Connect the harness of the CTL/FE head assembly to connector CN505 on the MDC-5 board.




### 4. CTL/FE head assembly cleaning

Clean the CTL head, FE head, tape cleaner, and tape guide with cleaning cloth moistened with cleaning fluid.

**Note**

After cleaning, wipe them with dry cloth.

## Adjustment after replacement

### 5. Tape running confirmation

(Refer to section 4-2-1.)

### 6. Video tracking adjustment

(Refer to section 4-2-2.)

### 7. CTL head height adjustment

(Refer to section 4-2-3.)

### 8. CTL head position adjustment

(Refer to section 4-2-4.)

### 9. TC head position adjustment

(Refer to section 4-2-6.)

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## 3-3-7. TC Head Replacement

### Outline

#### Replacement

TC head assembly removal
TC head replacement
TC head assembly installation
TC head assembly cleaning

#### Adjustment after replacement

Tape running confirmation
Video tracking adjustment
TC head height adjustment
CTL head position confirmation
TC head position adjustment

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

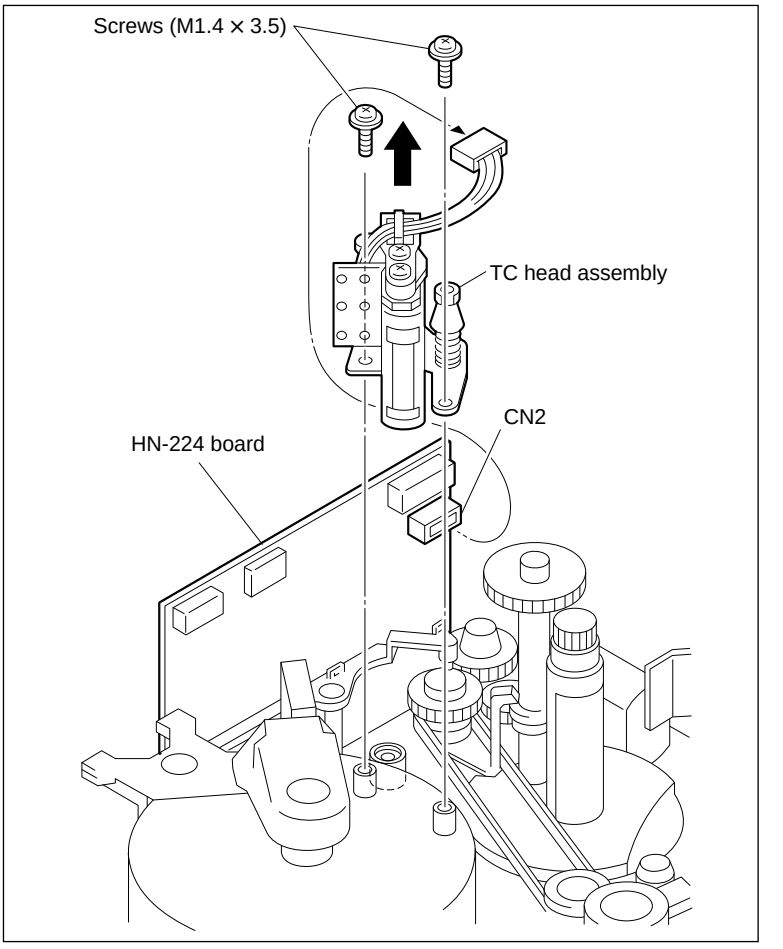
### Tools

| | |
|---|---|
| • Torque screwdriver bit (for M1.4) | J-6325-110-A |
| • Torque screwdriver bit (for M2) | J-6325-380-A |
| • Torque screwdriver (for 3 kg) | J-6325-400-A |
| • Cleaning cloth | 3-184-527-01 |
| • Cleaning fluid | 9-919-573-01 |

## Removal

### 1. TC head assembly removal

(1) Disconnect the connector CN2 on the HN-224 board.
(2) Remove the two screws, then remove the TC head assembly.



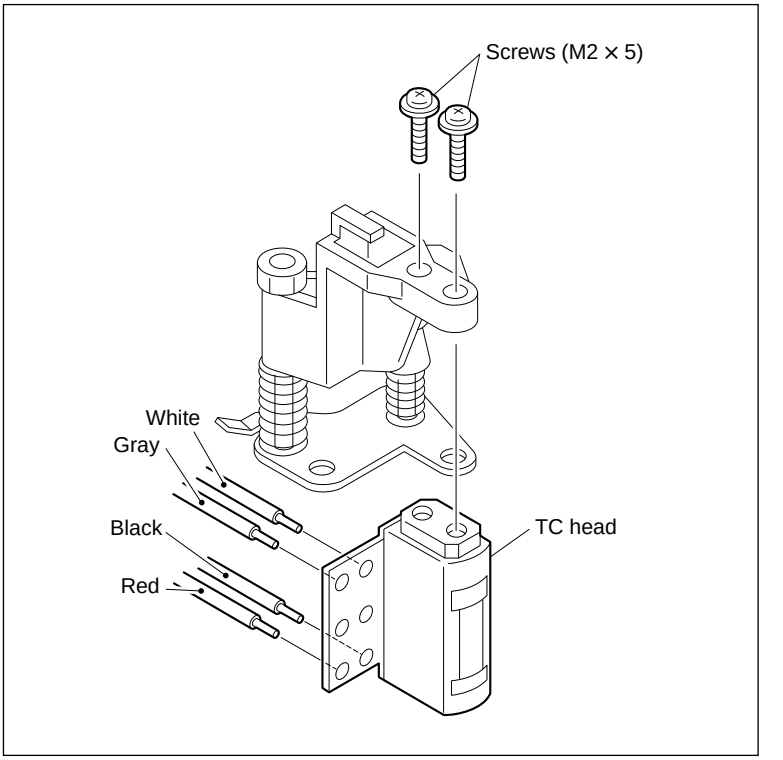

### 2. TC head replacement

(1) Remove the two screws at the top of the TC head assembly, then remove the TC head.
(2) Desolder the four lead wires on the printed circuit board of the TC head and solder them to a new head.

**Note**

Correct the lead wires to their right destinations with attention to the color of wires.

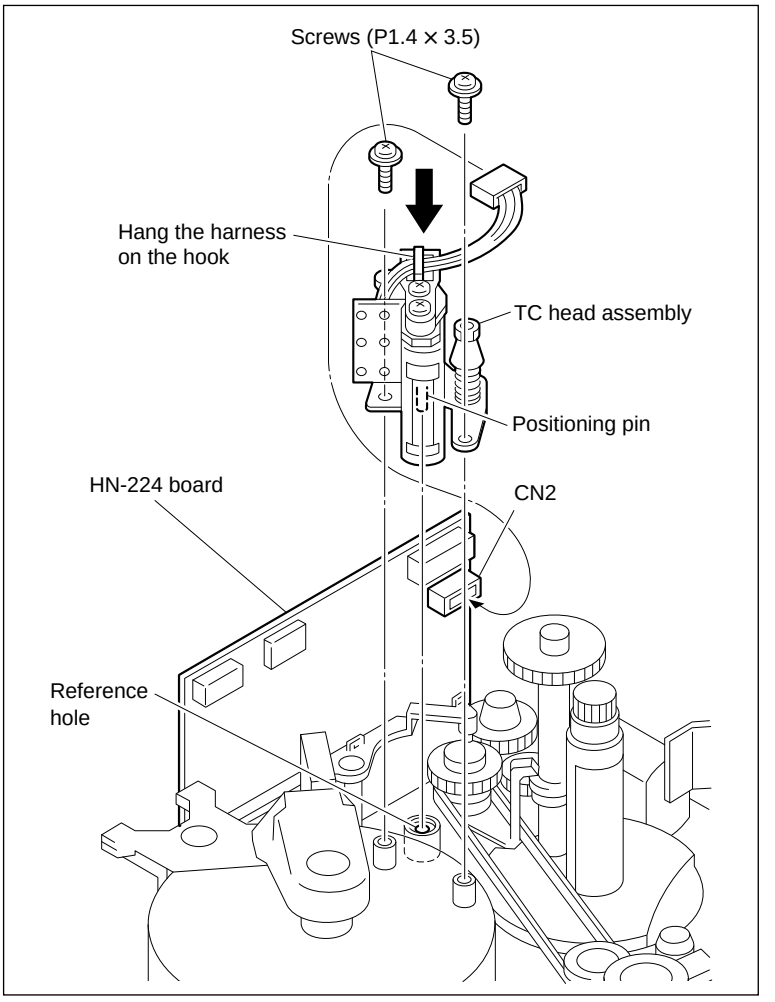
(3) Install the new TC head with two screws.



## Installation

### 3. TC head assembly installation

(1) Put the positioning pin of the TC head assembly into the reference hole of the chassis and install it with two screws.
(2) Connect the harness of the TC head assembly to connector CN2 on the HN-224 board.
(3) Hang the harness of the TC head assembly on the hook at the top of the head as shown in the figure.




### 4. TC head cleaning

Clean the TC head with cleaning cloth moistened with cleaning fluid.

**Note**

After cleaning, wipe the TC head with dry cloth.

## Adjustment after replacement

### 5. Tape running confirmation

(Refer to section 4-2-1.)

### 6. Video tracking adjustment

(Refer to section 4-2-2.)

### 7. TC head height adjustment

(Refer to section 4-2-5.)

### 8. CTL head position confirmation

(Refer to section 4-2-4.)

### 9. TC head position adjustment

(Refer to section 4-2-6.)

## 3-3-8. Reel Table Replacement

### Outline

#### Replacement

Tension regulator band assembly removal(required when replacing S reel table alone)
Reel table removal
Reel shaft cleaning
Reel table cleaning
Reel table installation (1)
Reel table height adjustment
Reel table installation (2)
Tension regulator band assembly installation (required when replacing S reel table alone)
Operation confirmation

#### Adjustment after replacement

FWD back tension adjustment (required when replacing S reel table alone)
Tape running adjustment
Brake torque confirmation

### Precaution

The reel table height is used as the reference of a tape running system. After the reel table is replaced, be sure to perform the reel table height adjustment.

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
4. Remove the cassette compartment.
   (Refer to section 3-3-24.)

**Note**

Stop washers are used for installation of S and T reel tables. Do not reuse them. Install the new ones (3-559-408-11) when replacing the S and T reel tables. Three polywashers are used each at the top and bottom of the reel tables. The polywasher (t 0.13: 3-303-961-01) at the top of the reel table is used as a spare during reel table replacement. Be careful not to lose and damage the polywasher.

### Tools

- Stop washer fastening tool J-6323-530-A
- FWD back tension measurement cassette J-6323-890-A
- Reel table height adjustment tool J-6324-150-A
- Cassette reference plate J-7032-610-A
- Cleaning cloth 3-184-527-01
- Cleaning fluid 9-919-573-01

## Removal

### 1. Tension regulator band assembly removal (required when replacing S reel table alone)

(1)Remove one stop washer of the tension regulator arm assembly.

**Note**

Do not apply excessive force to the tension regulator arm assembly when removing the stop washer.

(2) Move the S5 tape guide of the tension regulator in the direction indicated by the arrow and unhook the tension regulator band assembly from the tension regulator arm assembly.

**Note**

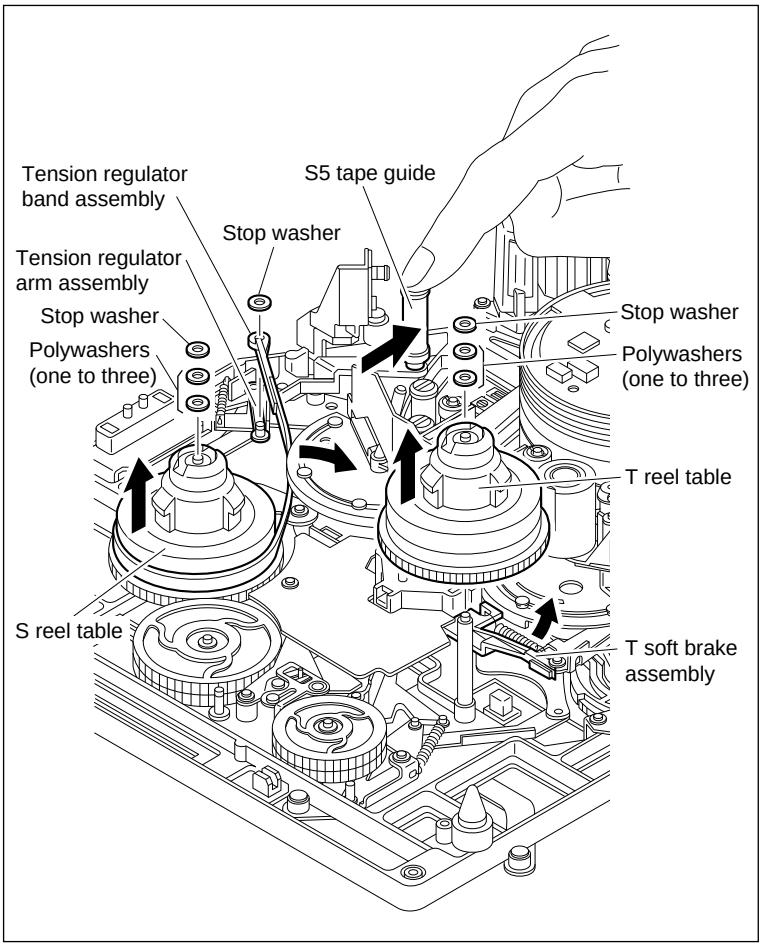
Do not touch the felt surface of the tension regulator band assembly with fingers. Do not bend the tension regulator band assembly or not make oil adhere to the felt surface.

### 2. Reel table removal

(1) Remove the stop washers fixing the reel tables using tweezers.
(2) Remove the polywashers (one to three) on the reel tables.
(3) Pull out the reel tables while releasing the tension regulator band assembly or soft brake assembly, with fingers, that interferes with the reel tables.

**Note**

Polywashers may adhere to the bottom of the reel tables. In this case, return all polywashers to the reel shaft.



## Installation

### 3. Reel shaft cleaning
Clean the reel shaft with cleaning cloth moistened with cleaning fluid.

### 4. Reel table cleaning
(1) Clean the surface of the reel table, which the tension regulator band assembly touches, with cleaning cloth moistened with cleaning fluid.
(2) Wipe the bottom of the reel table with dry cloth.

### 5. Reel table installation (1)
Pass the reel table through the reel shaft while releasing the soft brake with fingers.

### 6. Reel table height adjustment
(Refer to section 4-1-1.)

### 7. Reel table installation (2)
(1) Pass the remaining polywasher in step 6 through the reel shaft.
(2) Install the reel table using a new stop washer.
(3) Confirm that there is a play when the reel table is moved in the vertical direction. If there is no play, remove one polywasher on the reel table.

### 8. Tension regulator band assembly installation (required when replacing S reel table alone)
(1) Hook the tension regulator band assembly removed in step 1 on the tension regulator arm assembly.

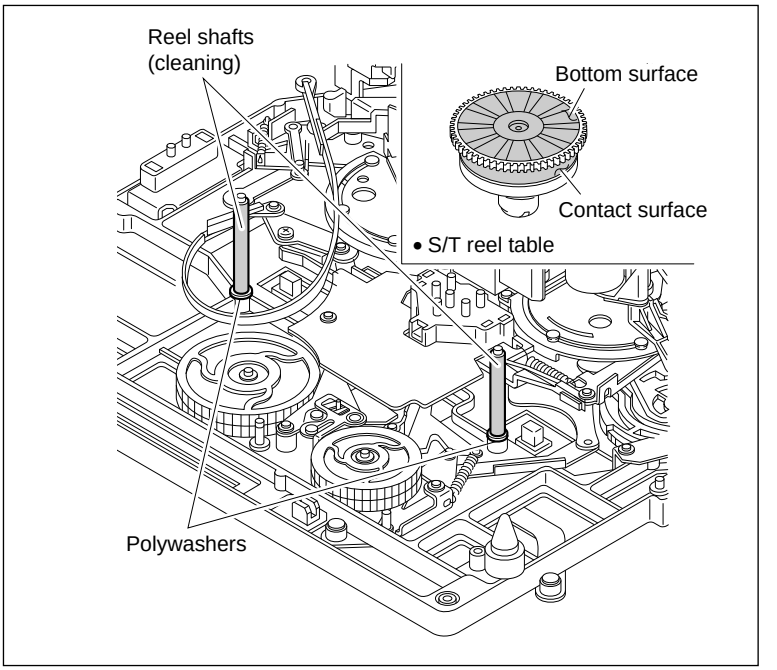
**Note**

Be careful not to bend and damage the tension regulator band assembly during installation.

(2) Install the tension regulator arm assembly using a new stop washer while holding it by a screwdriver.

**Note**

Do not apply excessive force to the tension regulator arm assembly and tension regulator link assembly when fixing the stop washer.



### 9. Operation confirmation

Turn the reel table gently while releasing the soft brake with fingers and confirm that the reel table and idler rotate smoothly.

---

**Adjustment after replacement**

### 10. FWD back tension adjustment (required when replacing S reel table alone)

(Refer to section 4-1-3.)

### 11. Brake torque confirmation

(Refer to section 4-1-4.)

### 12. Tape running adjustment

(Refer to section 4-2-1.)

## 3-3-9. Pinch Arm Assembly Replacement

### Outline

#### Replacement

Pinch arm assembly removal
Installation shaft cleaning
Installation shaft lubrication
Pinch arm assembly installation
Pinch roller cleaning

#### Adjustment after replacement

Tape running adjustment

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
4. Remove the cassette compartment.
   (Refer to section 3-3-24.)

**Note**

Stop washer is used for installation of pinch arm assembly. Do not reuse it. Install the new one (3-559-408-11) when replacing the pinch arm assembly.

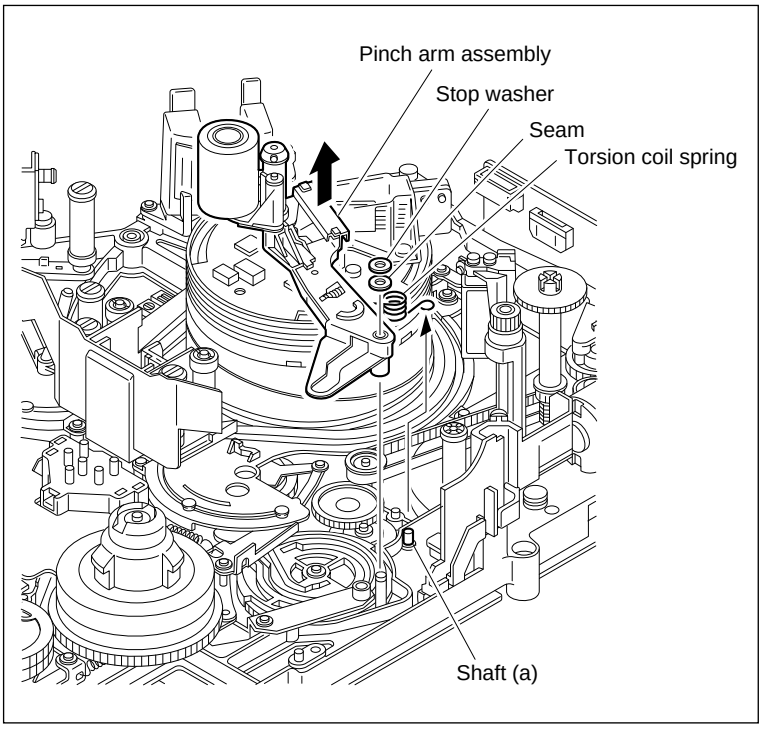
### Tools

- Stop washer fastening tool J-6323-530-A
- Cleaning cloth 3-184-527-01
- Cleaning fluid 9-919-573-01

## Removal

### 1. Pinch arm assembly removal

(1) Remove the stop washer using tweezers.
(2) Remove the pinch arm assembly while removing the torsion coil spring from chassis shaft (a).




## Installation

### 2. Installation shaft cleaning

Clean the installation shaft and bearing with cleaning cloth moistened with cleaning fluid.

### 3. Installation shaft lubrication

Apply a 1/2 drop of oil each to the installation shaft and bearing.

### 4. Pinch arm assembly installation

(1) Install the pinch arm assembly in the installation shaft while passing the bearing through the guide hole of the pinch arm assembly.

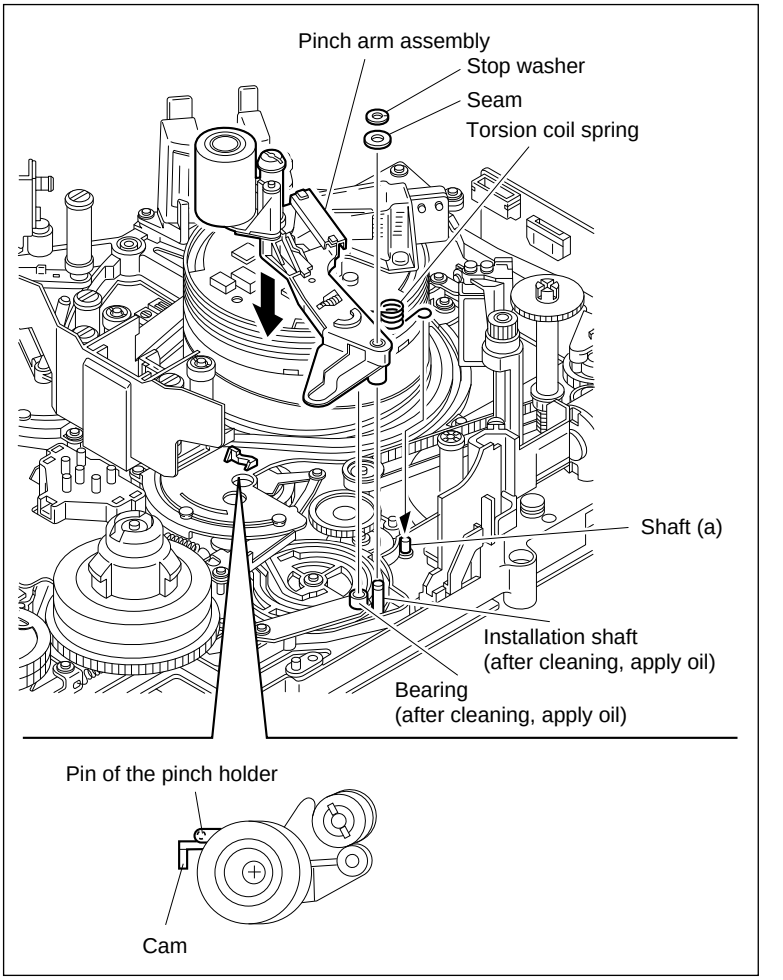
**Note**

The pin of the pinch holder should be positioned at the drum side of the cam on the T slide rail during installation.

(2) Hook the torsion coil spring on chassis shaft (a) using tweezers.
(3) Install a new stop washer.

### 5. Pinch roller cleaning

After installation, clean the pinch roller surface with cleaning cloth moistened with cleaning fluid.




## Adjustment after replacement

### 6. Tape running adjustment

(Refer to section 4-2-1.)

## 3-3-10. Sensor (A) Detection Pin Replacement

### Outline

#### Replacement

S soft brake assembly removal
Sensor cover (A) removal
Detection pin removal
Detection pin installation
Sensor cover (A) installation
Operation confirmation
S soft brake assembly installation

### Preparations

1. Turn off the power.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

The sensor (A) detection pin can be replaced with the cassette compartment installed in the unit.

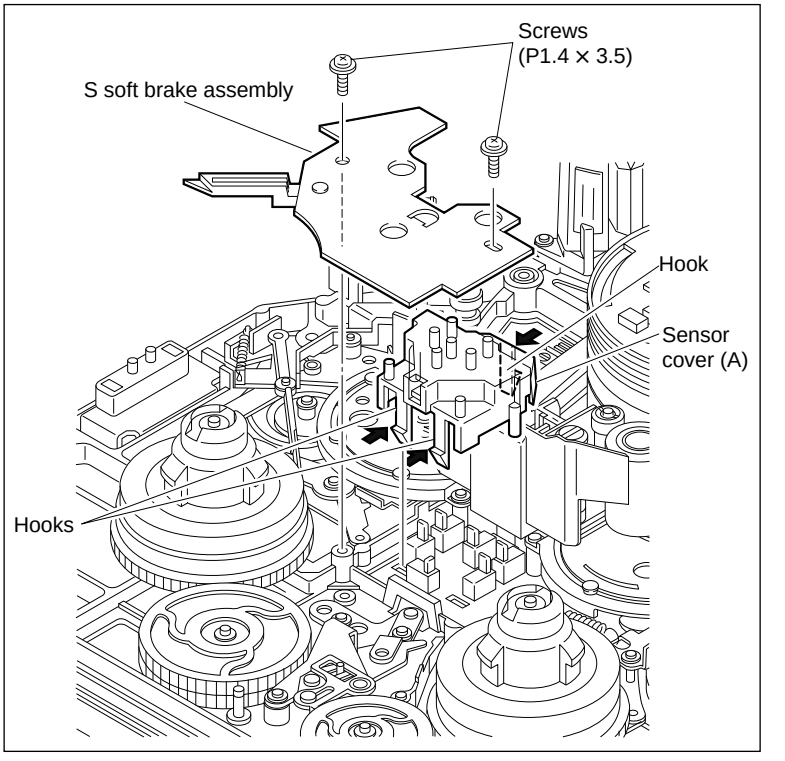
### Removal

#### 1. S soft brake assembly removal

Remove the two screws, then remove the S soft brake assembly.

#### 2. Sensor cover (A) removal

Remove the sensor cover (A) upward while unhooking the three hooks using tweezers.



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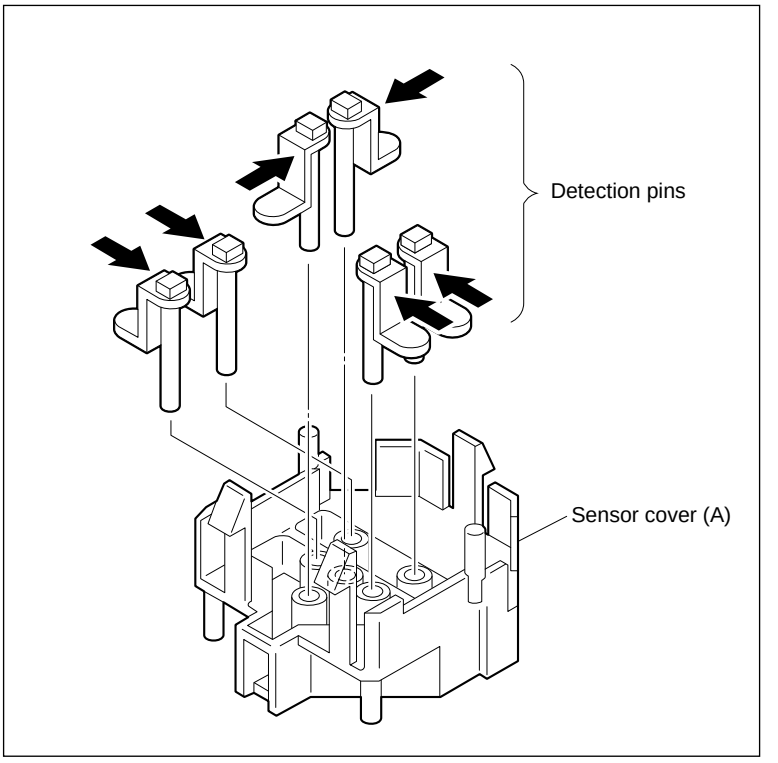
### 3. Detection pin removal

Remove each detection pin while pushing it in the direction indicated by the arrow.



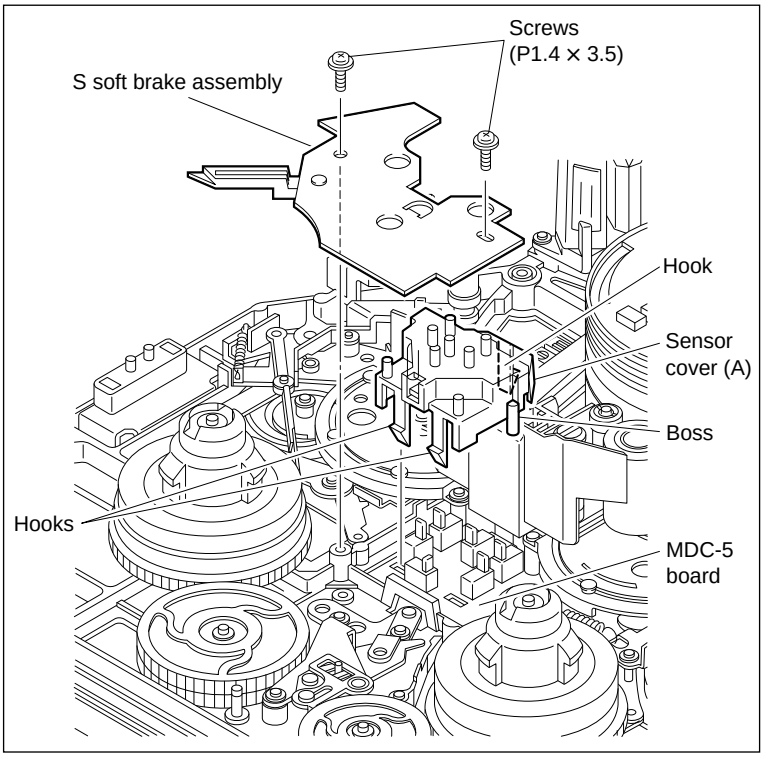

## Installation

### 4. Detection pin installation

Install the detection pin in the sensor cover (A) while paying attention to the direction of it.

### 5. Sensor cover (A) installation

Insert the bosses and hooks of the sensor cover (A) into the five holes on the MDC-5 board and install the sensor cover (A).




### 6. Operation confirmation

Confirm that the detection pin smoothly moves in the vertical direction and returns to the former position.

### 7. S soft brake assembly installation

Install the S soft brake assembly with two screws.

## 3-3-11. Sensor (B) Detection Pin Replacement

### Outline

**Replacement**

Sensor cover (B) removal
Detection pin removal
Detection pin installation
Sensor cover (B) installation
Operation confirmation

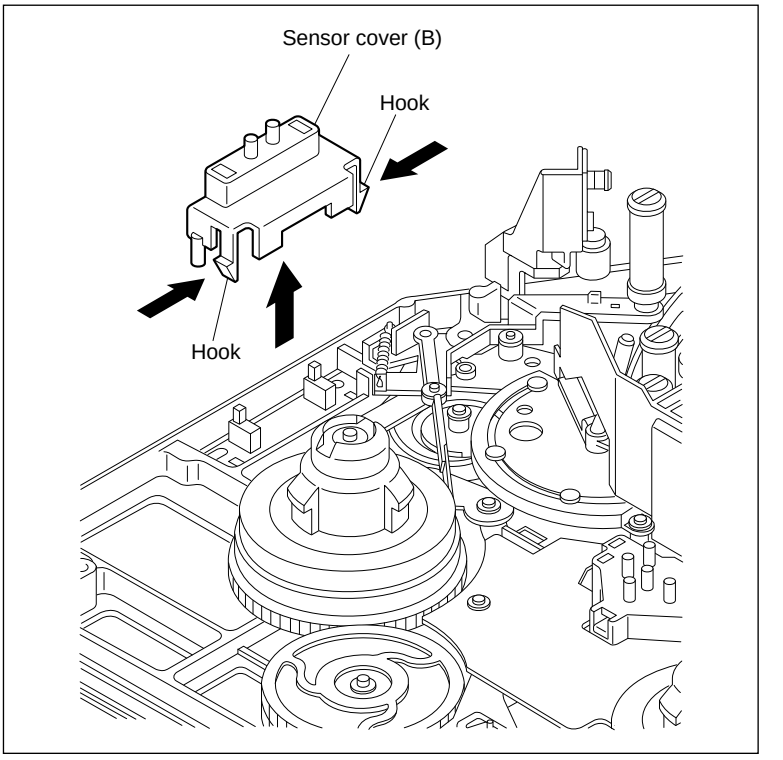
### Preparations

1. Turn off the power.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
3. Remove the cassette compartment.
   (Refer to section 3-3-24.)

### Removal

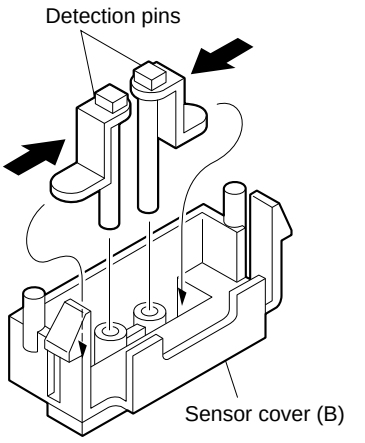
**1. Sensor cover (B) removal**

Remove the sensor cover (B) upward while unhooking the two hooks using tweezers.



### 2. Detection pin removal

Remove each detection pin while pushing it in the direction indicated by the arrow.



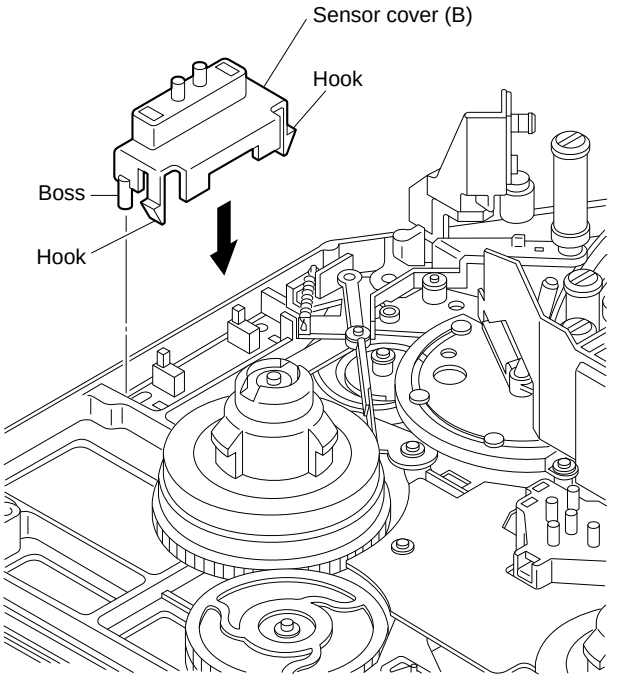

## Installation

### 3. Detection pin installation

Install the detection pin in the sensor cover (B) while paying attention to the direction of it.

### 4. Sensor cover (B) installation

Insert the bosses and hooks of the sensor cover (B) into the four holes on the MDC-5 board and install the sensor cover (B).




### 5. Operation confirmation

Confirm that the detection pin smoothly moves in the vertical direction and returns to the former position.

## 3-3-12. Tension Regulator Assembly Replacement

### Outline

#### Replacement

Tension regulator band assembly removal
Tension regulator assembly removal
Tension regulator assembly installation
Tension regulator band assembly installation
Tension regulator (S5) tape guide cleaning

#### Adjustment after replacement

Tension regulator operating position adjustment
FWD back tension adjustment
Tape running adjustment

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

Stop washer is used for installation of tension regulator assembly. Do not reuse it. Install the new one (3-559-408-11) when replacing the tension regulator assembly.

### Tools

- Stop washer fastening tool J-6325-530-A
- FWD back tension measurement cassette J-6323-890-A
- Cleaning cloth 3-184-527-01
- Cleaning fluid 9-919-573-01

## Removal

### 1. Tension regulator band assembly removal

(1) Remove one stop washer of the tension regulator arm assembly.

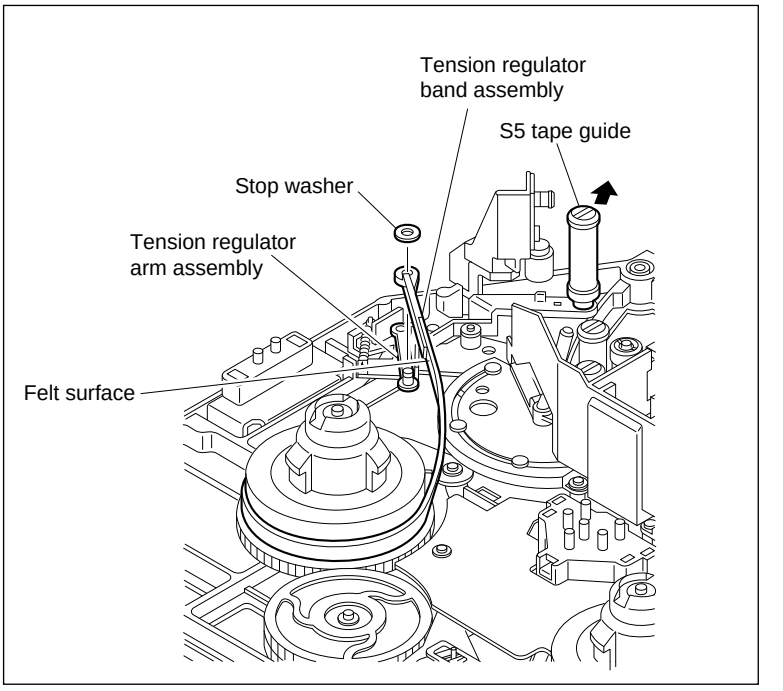
**Note**

Do not apply excessive force to the tension regulator arm assembly when removing the stop washer.

(2) Move the S5 tape guide of the tension regulator in the direction indicated by the arrow and unhook the tension regulator band assembly from the tension regulator arm assembly.

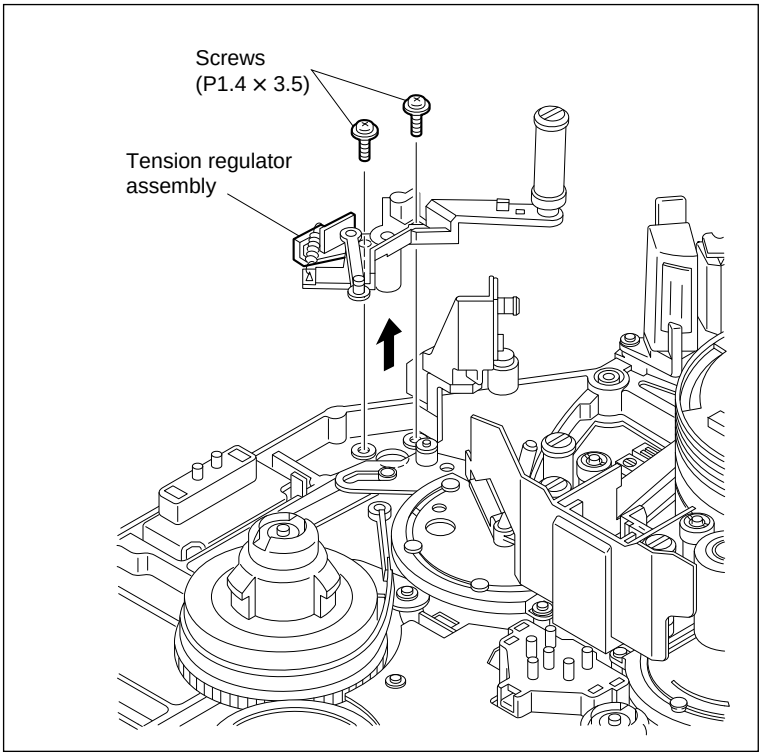
**Note**

Do not touch the felt surface of the tension regulator band assembly with fingers. Do not bend the tension regulator band assembly or not make oil adhere to the felt surface.




### 2. Tension regulator assembly removal

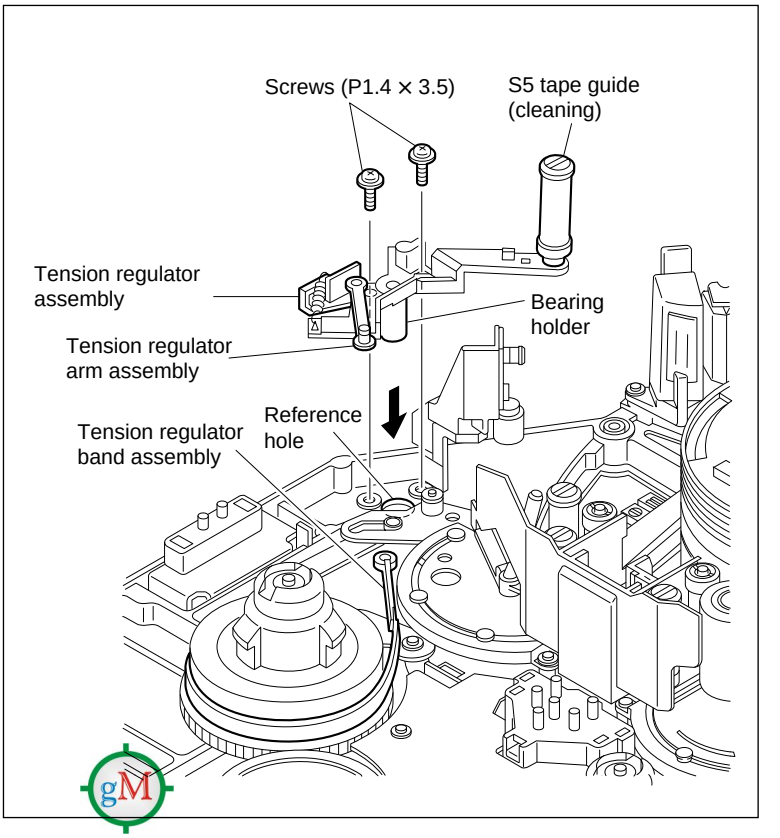
Remove the two screws, then remove the tension regulator assembly.



## Installation

### 3. Tension regulator assembly installation

Insert the bearing holder of the tension regulator assembly into the reference hole of the chassis and install the tension regulator assembly with two screws.




### 4. Tension regulator band assembly installation

(1) Hook the tension regulator band assembly removed in step 1 on the tension regulator arm assembly.

**Note**

Be careful not to bend or damage the tension regulator band assembly during installation.

(2) Install the tension regulator arm assembly using a new stop washer while holding it by a screwdriver.

**Note**

Do not apply excessive force to the tension regulator arm assembly and tension regulator link assembly when fixing the stop washer.

### 5. Tension regulator (S5) tape guide cleaning

Clean the tension regulator (S5) tape guide with cleaning cloth moistened with cleaning fluid. After cleaning, wipe the tension regulator (S5) tape guide with dry cloth.

## Adjustment after replacement

### 6. Tension regulator operating position adjustment

(Refer to section 4-1-2.)

### 7. FWD back tension adjustment

(Refer to section 4-1-3.)

### 8. Tape running adjustment

(Refer to section 4-2-1.)

## 3-3-13. Gear Block Assembly Replacement

### Outline

#### Replacement

Manual eject drive removal
VH cleaner assembly removal
TC head assembly removal
Pulley gear (B) removal
Gear block assembly removal
Gear block assembly installation
Pulley gear (B) installation
Operation confirmation
TC head assembly installation
VH cleaner assembly installation
Manual eject drive installation

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

The gear block assembly can be replaced with the cassette compartment installed in the unit.

### Tools

- Torque screwdriver bit (for M1.4) J-6325-110-A
- Torque screwdriver (for 3 kg) J-6325-400-A

## Removal

### 1. Manual eject drive removal

Unhook the hook of the gear block assembly in the direction indicated by the arrow and remove the manual eject drive.

**Note**

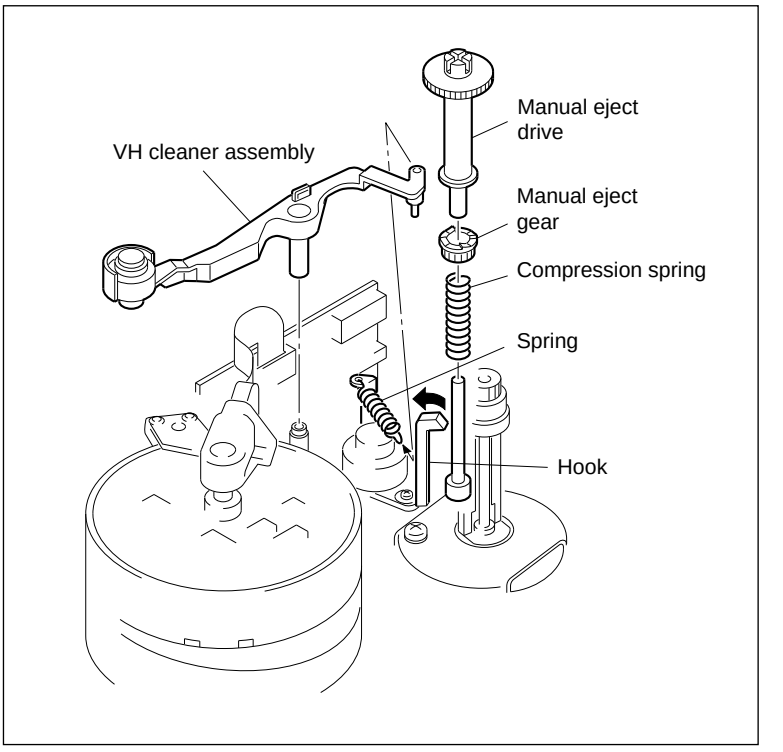
The compression spring and manual eject gear are removed simultaneously with when the manual eject drive is removed. Be careful not to lose them.

### 2. VH cleaner assembly removal

Remove the spring, then remove the VH cleaner assembly. (Refer to section 3-2-5.)

### 3. TC head assembly removal

(Refer to section 3-3-7.)

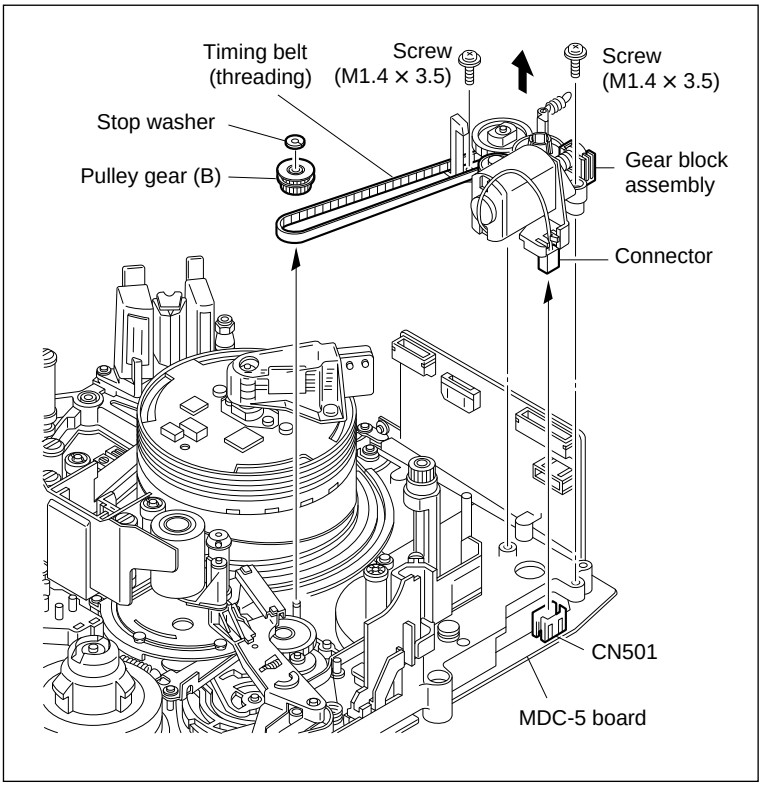



### 4. Pulley gear (B) removal

Remove the stop washer, then remove the pulley gear (B).

### 5. Gear block assembly removal

(1) Remove the two screws securing the gear block assembly.
(2) Remove the gear block assembly while disconnecting connector CN501 on the MDC-5 board.



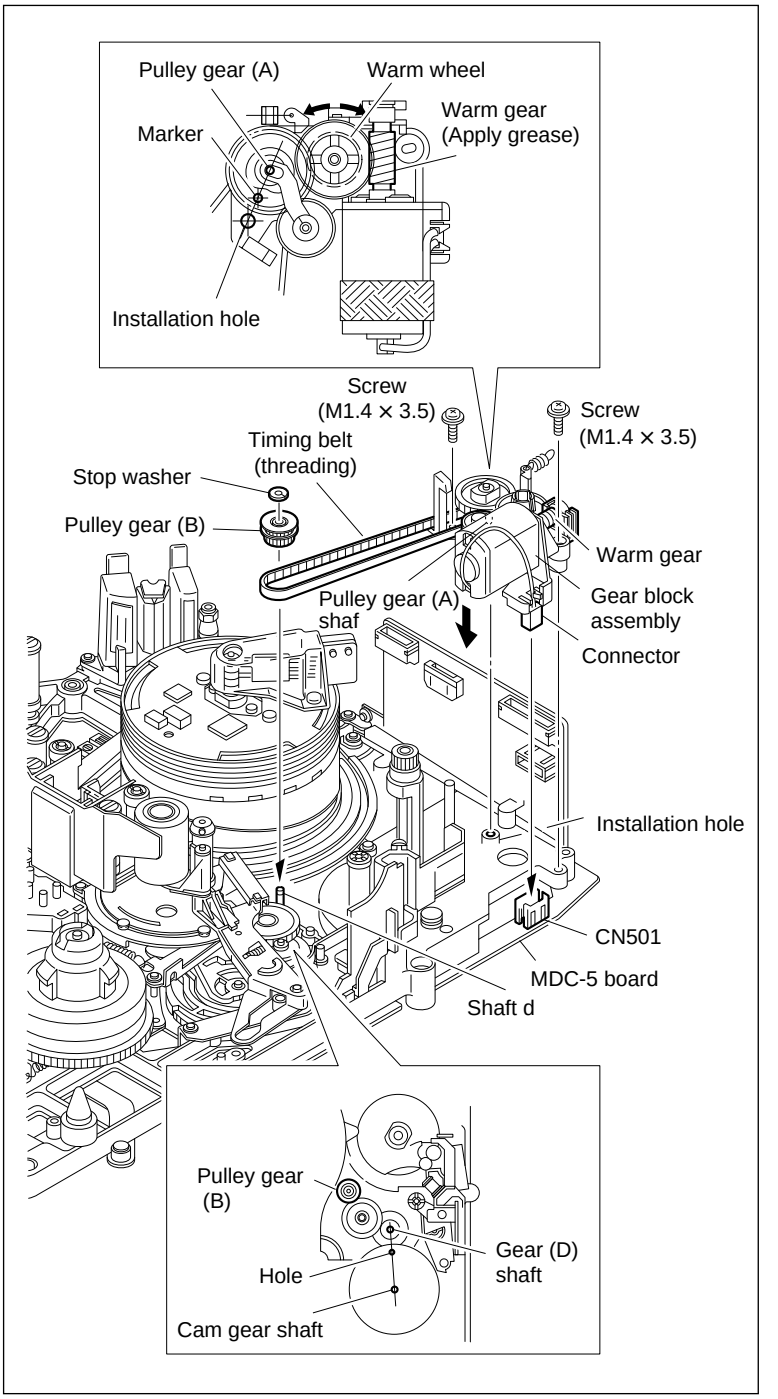
## Installation

### 6. Gear block assembly installation

(1) Apply the proper amount of grease to the warm gear.
(2) Turn the warm wheel for phase adjustment so that the marker on the pulley gear (A) is located in a straight line with the installation hole and shaft “b” of the motor base assembly.
(3) Insert the shaft of the pulley gear (A) into the installation hole of the chassis and connect the harness connector to connector CN501 on the MDC-5 board.
(4) Turn the gear (C) for phase adjustment so that the hole of the cam gear is located in a straight line with the shaft of gear (D) and cam gear.
(5) Install the gear block assembly with two screws.

### 7. Pulley gear (B) installation

Hook the timing belt (threading) on the pulley gear (B). Put the pulley gear (B) with timing belt on the shaft d while keeping the states in steps (2) and (4) in procedure 6.




### 8. Operation confirmation

Turn the warm wheel of the gear block assembly using a Phillips screwdriver and confirm that the threading/unthreading operation is performed smoothly. (Refer to section 3-1-4.)

**Note**

Do not turn the warm wheel excessively. This may damage the unit.

### 9. TC head assembly installation

(Refer to section 3-3-7.)

### 10. VH cleaner assembly installation

Install the VH cleaner assembly and hook the spring. (Refer to section 3-2-5.)

### 11. Manual eject drive installation

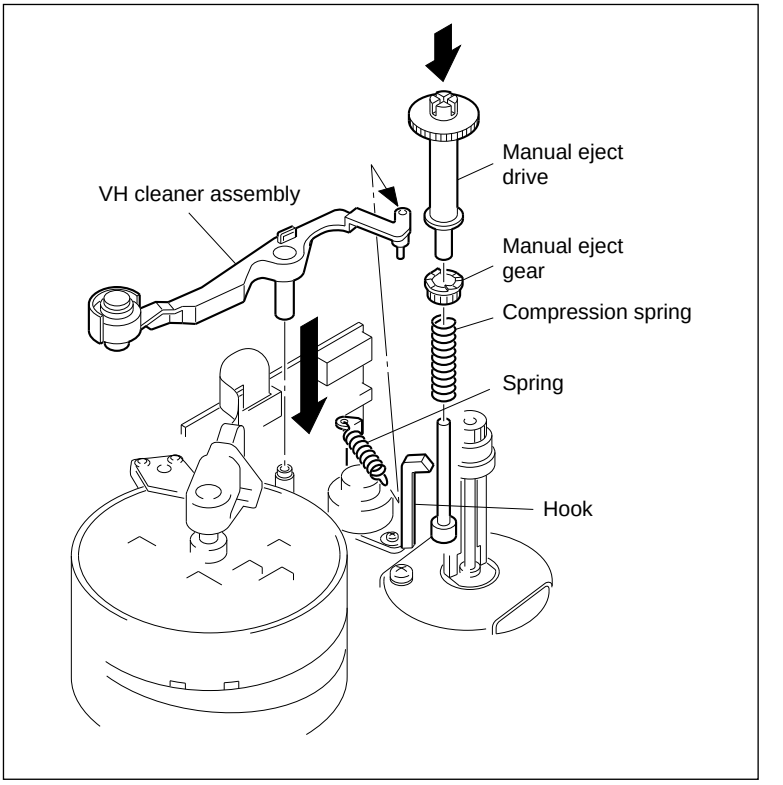
(1) Pass the compression spring and manual eject gear removed in procedure 1 through the shaft of the chassis.

**Note**

Install the manual eject gear with the hook of the clutch upward.

(2) Install the manual eject drive onto the shaft of the chassis and push fully until hooked by the gear block assembly.

(3) Confirm that the gear at the top of the capstan motor engages with the gear of the manual eject drive when the manual eject drive is pushed downward. Moreover, confirm that the manual eject drive smoothly returns to the former state when it is released.



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## 3-3-14. FE Head Replacement

### Outline

#### Replacement

CTL/FE head assembly removal
FE head removal
FE head replacement
CTL/FE head assembly installation
CTL/FE head assembly cleaning

#### Adjustment after replacement

Tape running adjustment

**CAUTION**

Never touch the tape cleaner on the entrance head block with bare hands.
The tape cleaner has a sharp edge. Pay careful attention when replacing or adjusting the CTL head.

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

The FE head can be replaced with the cassette compartment installed in the unit.

### Tools

- Torque screwdriver bit (for M2) J-6325-380-A
- Torque screwdriver (for 3 kg) J-6325-400-A

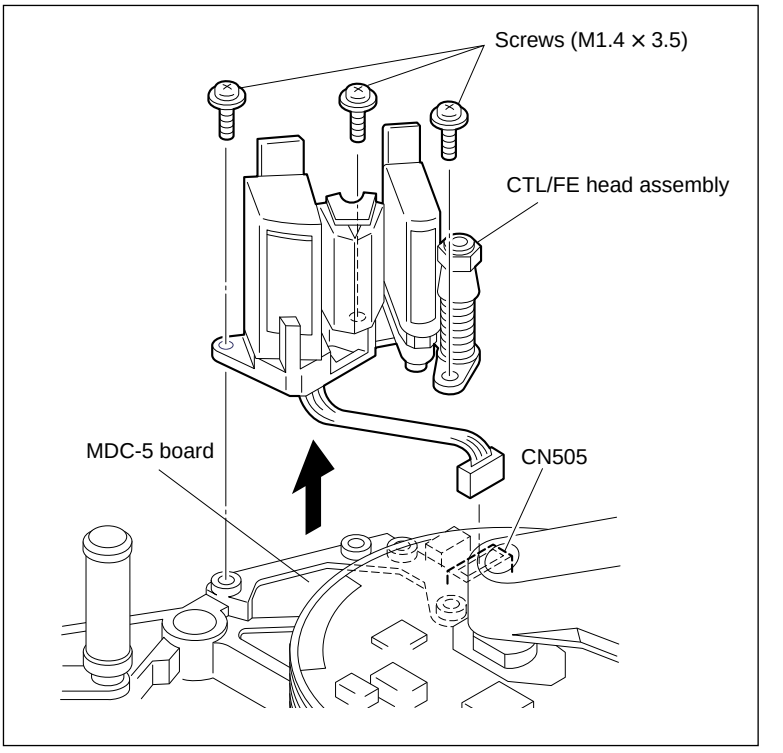
## Removal

### 1. CTL/FE head assembly removal

(1) Disconnect connector CN505 on the MDC-5 board.
(2) Remove the three screws, then remove the CTL/FE head assembly from the unit.

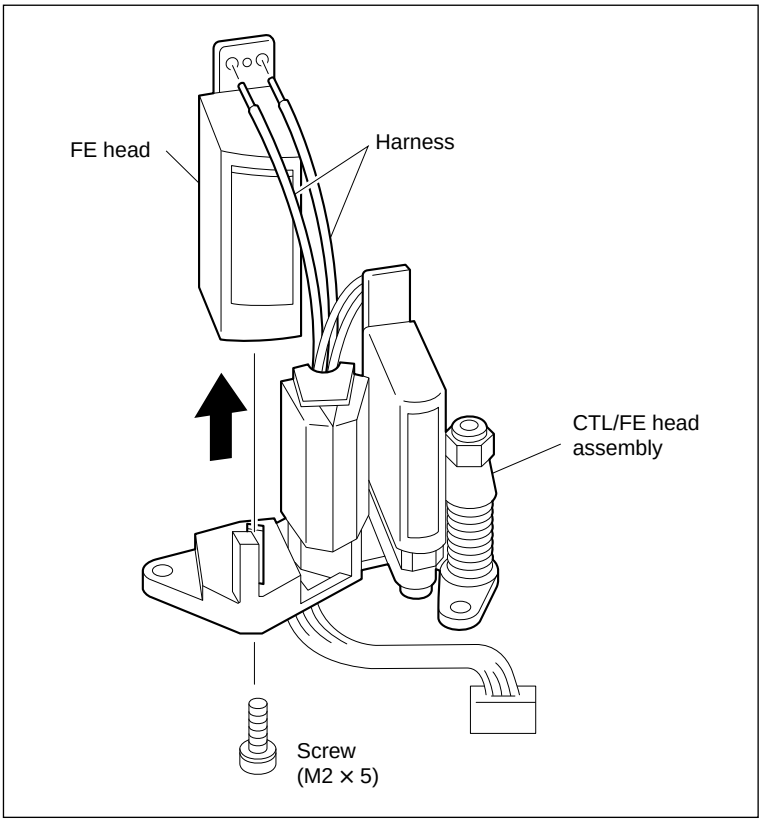
**Note**

Be careful not to damage the video head, drum, erase head, tape guide, and other parts with a screwdriver.




### 2. FE head removal

(1) Desolder the two lead wires connected to the FE head.
(2) Remove one screw at the back of the CTL/FE head assembly, then remove the FE head.



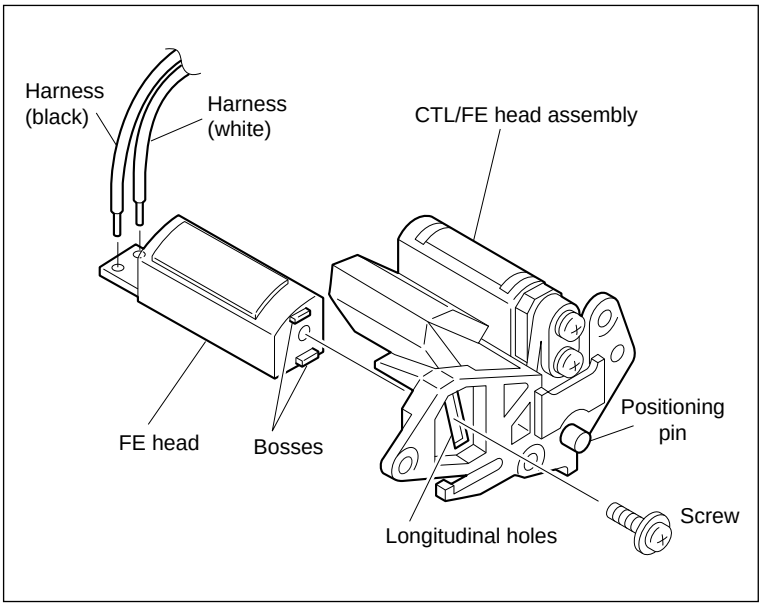
### 3. FE head replacement

(1) Insert the two bosses on a new FE head into the longitudinal holes of the CTL/FE head assembly and install the FE head with one screw.
At that time, install the FE head while pushing it to the projection on the CTL/FE head assembly.
[Tightening torque:
$9 \times 10^{-2}$ N•m (0.9 kgf•cm)]

(2) Solder the two lead wires to the printed circuit board of the FE head.

**Note**

Solder lead wires to the correct places.




## Installation

### 4. CTL/FE head assembly installation

(1) Insert the positioning pin of the CTL/FE head into the reference hole of the chassis and install it with three screws.

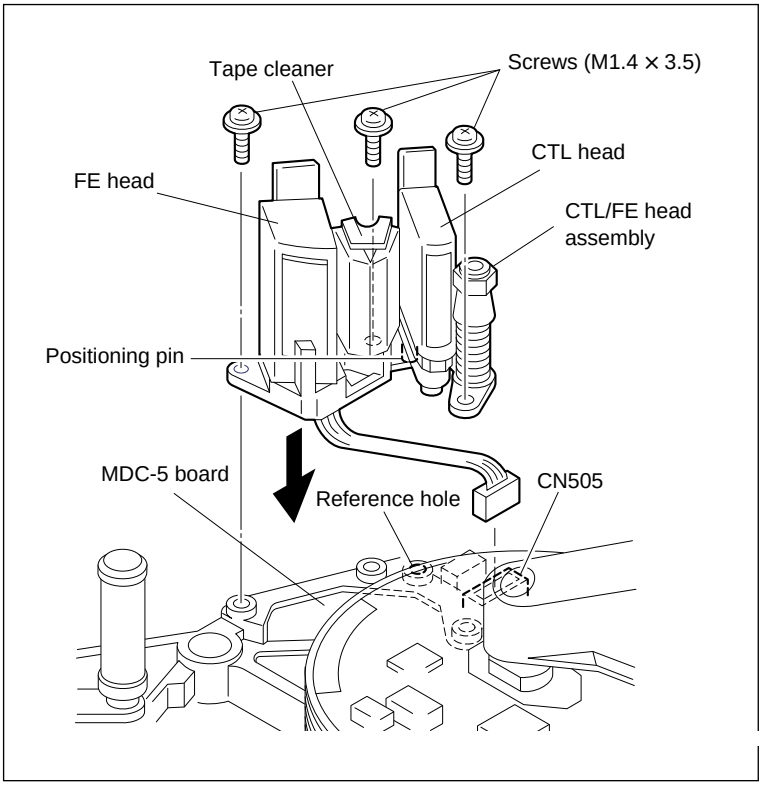
(2) Connect the harness of the CTL/FE head assembly to connector CN505 on the MDC-5 board.

### 5. CTL/FE head assembly cleaning

Clean the CTL head, FE head, tape cleaner, and tape guide with cleaning cloth moistened with cleaning fluid.

**Note**

After cleaning, wipe them with dry cloth.




## Adjustment after replacement

### 6. Tape running adjustment

(Refer to section 4-2-1.)

## 3-3-15. Tape Cleaner Replacement

**CAUTION**

Never touch the edge of a tape cleaner with bare hands.
The tape cleaner has a sharp edge. This may cause injury.

**Note**

Do not give a shock to the tape cleaner (for example, do not fall it on the floor).
This may damage the edge because the tape cleaner is made of hard materials. If the tape cleaner is shocked, observe the edge using a magnifying glass and confirm that no damage exists.

### Outline

#### Replacement

Tape cleaner removal
Tape cleaner installation
Operation confirmation

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

### Tools

- Torque screwdriver bit (for M2) J-6325-380-A
- Torque screwdriver (for 3 kg) J-6325-400-A

### Removal

#### 1. Tape cleaner removal

Remove one screw, then remove the tape cleaner.

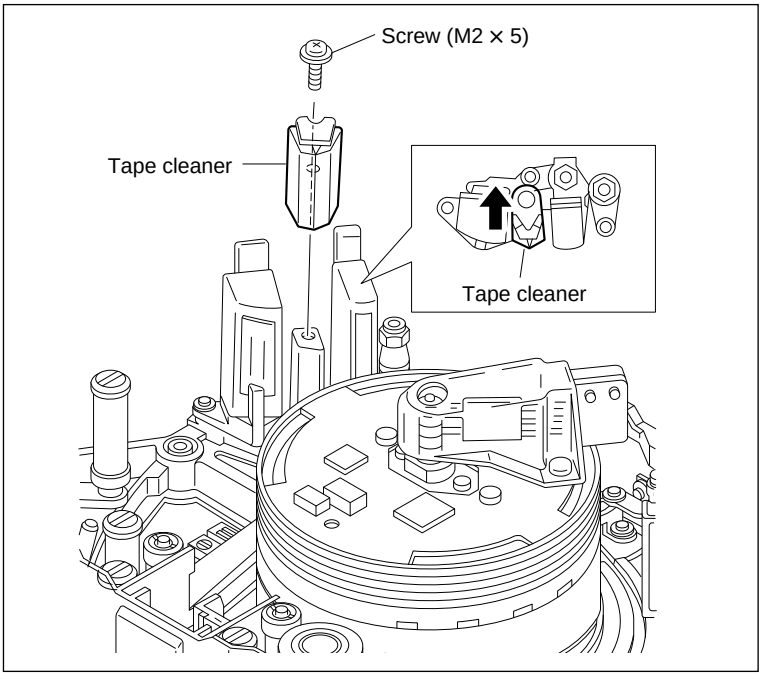
### Installation

#### 2. Tape cleaner installation

Install the tape cleaner with one screw while pushing the tape cleaner in the direction indicated by the arrow.
[Tightening torque: $20 \times 10^{-2}$ N•m (2.0 kgf•cm)]

#### 3. Operation confirmation

(1) Turn on the power.
(2) Insert the tape with the outside panel opened and put the unit into the PLAY state.
(3) Confirm that the tape runs in contact with the tape cleaner during tape running.



## 3-3-16. Tape Guide (S1, T1, T3) Replacement

The T4 tape guide cannot be replaced because it is fixed. Do not turn forcedly the upper flange.
When the following tape guides need replacing, replace it with a new assembly.

- S2 tape guide (Refer to “3-3-18. S Slider Assembly Replacement”.)
- S3 or S4 tape guide (Refer to “3-3-20. Threading Arm Assembly Replacement”.)
- S5 tape guide (Refer to “3-3-12. Tension Regulator Assembly Replacement”.)
- T2 tape guide (Refer to “3-3-19. T Slider Assembly Replacement”.)

### Outline

#### Replacement

Tape guide removal
Tape guide installation

#### Adjustment after replacement

Tape guide height adjustment

### Precautions

- Each tape guide in the unit differs in shape, but it is almost the same in the replacement of parts.
- Replace them one at a time when multiple tape guides are replaced. Perform the adjustment for each replacement. It is very difficult to adjust multiple tape guides simultaneously.
- Fasten the setscrew at the top of the tape guide with the tightening torque below.
  $9 \times 10^{-2}$ N•m (0.9 kgf•cm)

### Preparations

1. Turn off the power.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
3. Remove the cassette compartment.
   (Refer to section 3-3-24.)

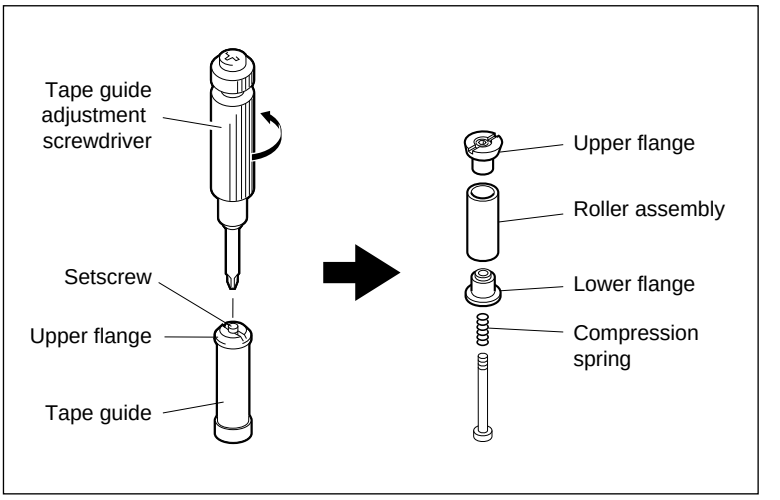
### Tools

- Tape guide adjustment screwdriver (45) J-6322-420-A
- Torque screwdriver bit (for M2) J-6325-380-A
- Torque screwdriver (for 3 kg) J-6325-400-A

## Removal

### 1. Tape guide removal

(1) As shown in the figure, put the tape guide adjustment screwdriver on the upper flange. And loosen the screw at the upper part of the tape guide about 1/4 turn counterclockwise.
(2) Turn the control knob of the screwdriver counterclockwise and remove the upper flange.
(3) Extract the roller assembly.
At that time, the lower flange and compression spring can be removed.




## Installation

### 2. Tape guide installation

(1) Pass the compression spring through the guide shaft.
(2) Pass the lower flange through the guide shaft.
(3) Pass the roller assembly through the guide shaft.
(4) Insert the upper flange until it strikes against the guide shaft.

**Note**

Perform step (4) with the setscrew protruded about 0.4 mm(S1/T1 tape guide) or 0.6 mm(T3 tape guide) from the upper surface of the upper flange when the upper flange or setscrew is replaced.

## Adjustment after replacement

### 3. Tape guide height adjustment

(Refer to “4-2-1. Tape Running Adjustment”.)

## 3-3-17. Cassette Stopper Replacement

### Outline

### Replacement

Full-top sensor assembly removal
Cassette stopper removal
Cassette stopper installation
Full-top sensor assembly installation.

### Precaution

Take care not to damage the drum, tape guides, stationary heads during replacement.

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
4. Remove the cassette compartment.
   (Refer to section 3-3-24.)

### Tools

- Torque screwdriver bit (for M1.4) J-6325-110-A
- Torque screwdriver (for 3 kg) J-6325-400-A

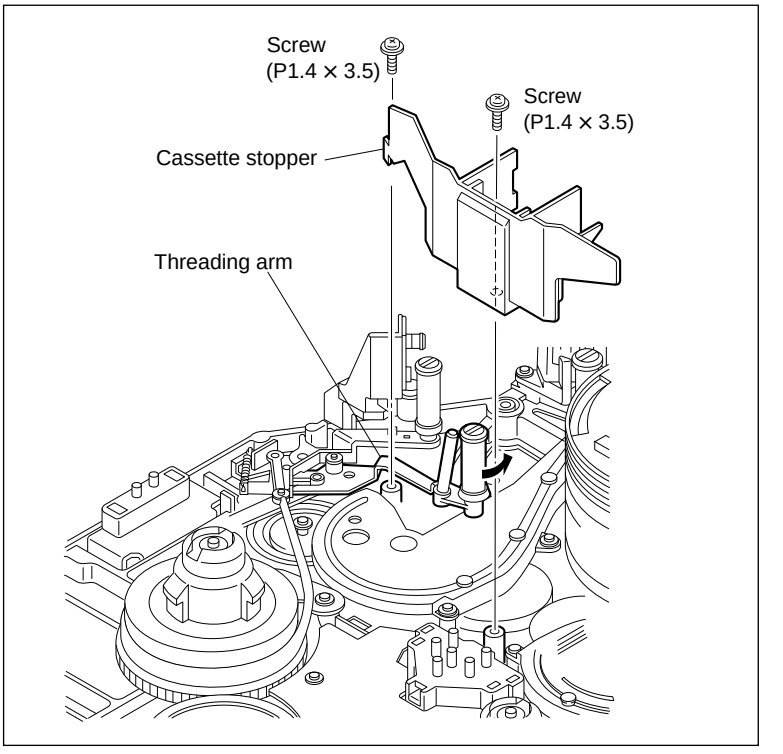
### Removal

#### 1. Full-top sensor assembly removal

(Refer to section 3-3-22.)

#### 2. Cassette stopper removal

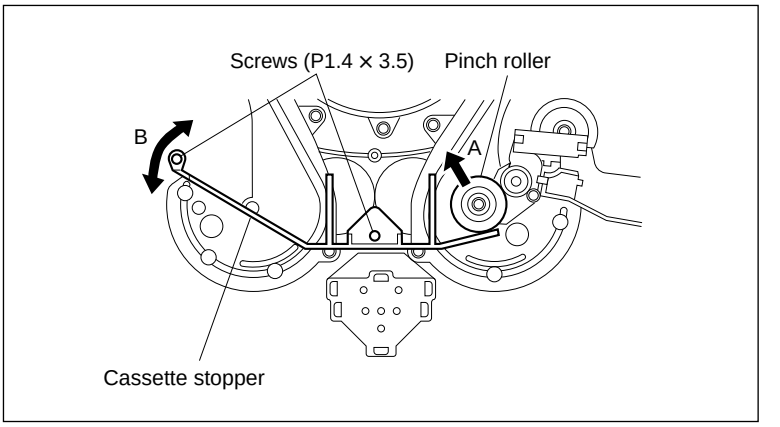
(1) Turn the warm wheel with the Phillips screwdriver clockwise until the screw in the bottom of the pinch roller come into sight.
(2) Remove the two screws, then remove the cassette stopper.



## Installation

### 3. Cassette stopper installation

(1) Temporarily attach the cassette stopper with two screws.
(2) Move the cassette stopper in the direction indicated by arrow B so that the pinch roller makes contact with the cassette stopper and a clearance is made with the pinch roller moved in the direction A.
(3) Tighten the two screws of the cassette stopper.
[Tightening torque:
$9 \times 10^{-2}$ N•m (0.9 kgf•cm)]




### 4. Full-top sensor assembly installation

(Refer to section 3-3-22.)

## 3-3-18. S Slider Assembly Replacement

### Outline

#### Replacement

Full-top sensor assembly removal
Tension regulator band assembly removal
Tension regulator assembly removal
Threading arm assembly removal
Cassette stopper removal
S rail removal
S slider assembly removal
S slider assembly installation
S rail installation
Cassette stopper installation
Threading arm assembly installation
Tension regulator assembly installation
Tension regulator band assembly installation
Full-top sensor assembly installation
Operation confirmation
Heads and tape running path cleaning

#### Adjustment after replacement

Tension regulator arm operation position adjustment
FWD back-tension adjustment
Tape running adjustment

### Precaution

Take care not to damage the drum, tape guides, stationary heads during replacement.

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
4. Remove the cassette compartment.
   (Refer to section 3-3-24.)

**Note**

Three stop washers are used for installation of threading arm assembly and tension regulator band assembly. Do not reuse them. Install the new ones (3-559-408-11) when replacing the threading arm assembly or the tension regulator band assembly.

## Tools

- FWD back-tension measurement cassette J-6323-190-A
- Stop washer insertion tool J-6323-530-A
- Cleaning cloth 3-184-527-01
- Cleaning fluid 9-919-573-01
- Torque screwdriver bit (for M1.4) J-6325-110-A
- Torque screwdriver (for 3 kg) J-6325-400-A

## Removal

### 1. Full-top sensor assembly removal

(Refer to section 3-3-22.)

### 2. Tension regulator band assembly removal

(Refer to section 3-3-12.)

### 3. Tension regulator assembly removal

(Refer to section 3-3-12.)

### 4. Threading arm assembly removal

(Refer to section 3-3-20.)

### 5. Cassette stopper removal

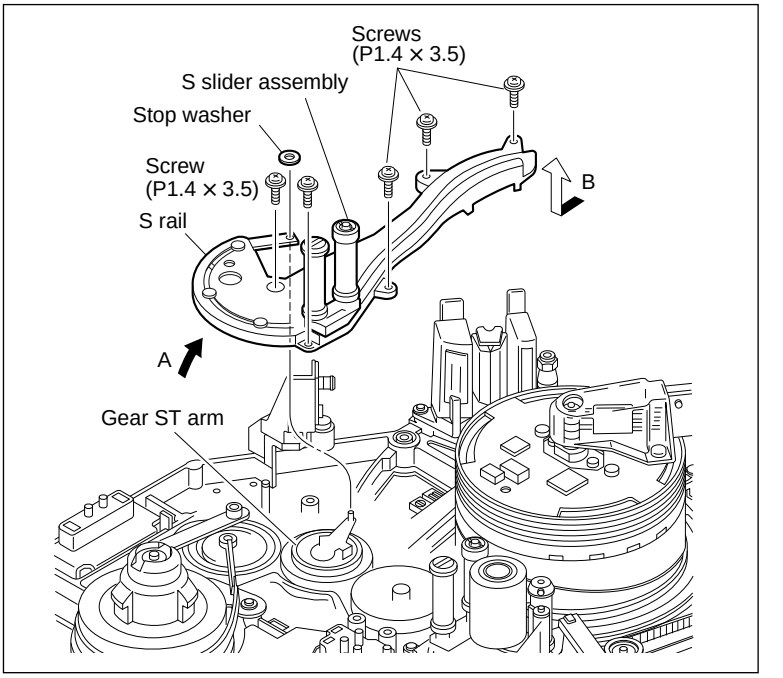
(Refer to section 3-3-17.)

### 6. S rail removal

(1) Remove the five screws and one stop washer.
(2) Lift the front part of the S rail slightly in the direction indicated by arrow A, then remove the S rail in the direction indicated by arrow B together with the S slider assembly.

**Note**

Do not apply excessive force to the gear ST arm when removing the stop washer.



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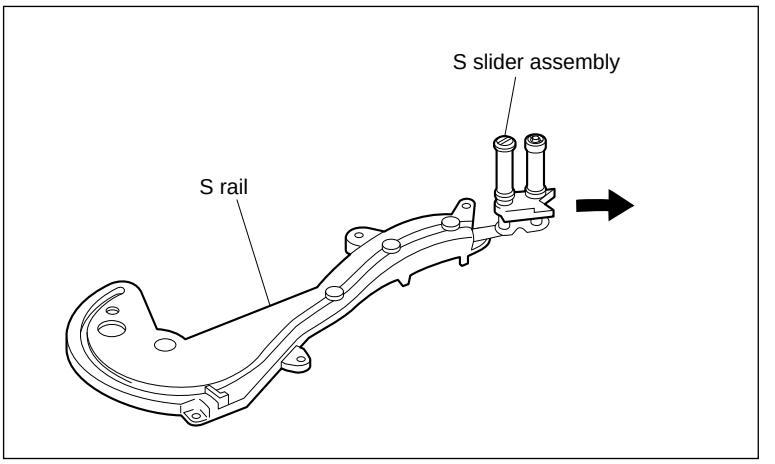
### 7. S slider assembly removal

Slide the S slider assembly backward and extract it from the S rail.



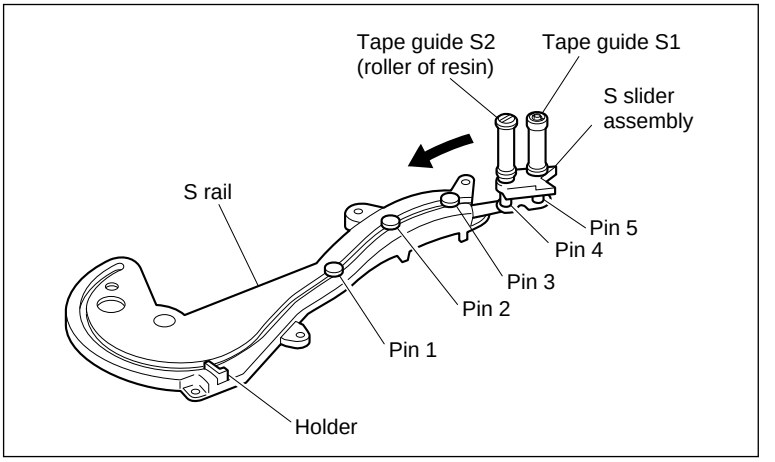

## Installation

### 8. S slider assembly installation

Pass the pins of the S slider assembly through the groove of the S rail in the order of pins 1 to 5 and insert it until the S slider assembly is put in the holder of the S rail.

**Notes**

- Insert the S slider assembly correctly in the order of pins. (Tape guide S2 should be put in front of tape guide S1.)
- Do not apply excessive force to the S slider assembly and S rail during insertion.




After installation, confirm that the heads of each pin are not out of the groove of the rail.

### 9. S rail installation

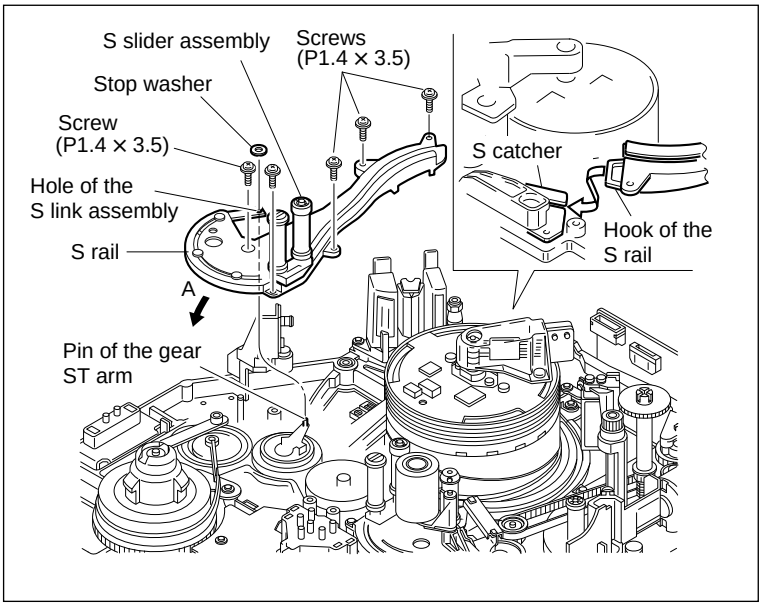
(1) Insert the hook at the back of the S rail under the S catcher and lower the front part in the direction indicated by arrow A.

(2) Pass the hole of the S link assembly through the pin of the gear ST arm and install it with a stop washer.

**Note**

Do not apply excessive force to the gear ST arm when installing the stop washer.

(3) Install the S rail with five screws.
[Tightening torque:
$9 \times 10^{-2}$ N•m (0.9 kgf•cm)]




### 10. Cassette stopper installation

(Refer to section 3-3-17.)

### 11. Threading arm assembly installation

(Refer to section 3-3-20.)

### 12. Tension regulator assembly installation

(Refer to section 3-3-12.)

### 13. Tension regulator band assembly installation

(Refer to section 3-3-12.)

### 14. Full-top sensor assembly installation

(Refer to section 3-3-22.)

### 15. Operation confirmation

Turn the warm wheel of the gear block assembly using a Phillips screwdriver and confirm that the threading/unthreading operation is performed smoothly. (Refer to section 3-1-4.)

**Note**

Do not turn the warm wheel excessively. This may damage the unit.

### 16. Heads and tape running path cleaning

Clean the portions below with cleaning cloth moistened with cleaning fluid.

- Video heads
- Tape running path of the upper drum
- Lead and tape running path of the lower drum
- All tape guides and pinch roller

After cleaning, wipe them with dry cloth.

---

**Adjustment after replacement**

### 17. Tension regulator operation position adjustment

(Refer to section 4-1-2.)

### 18. FWD back-tension adjustment

(Refer to section 4-1-3.)

### 19. Tape running adjustment

(Refer to section 4-2-1.)

## 3-3-19. T Slider Assembly Replacement

### Outline

#### Replacement

Full-top sensor assembly removal
Pinch arm assembly removal
Cassette stopper removal
T rail removal
T slider assembly removal
T slider assembly installation
T rail installation
Pinch arm assembly installation
Cassette stopper installation
Full-top sensor assembly installation
Operation confirmation
Heads and tape running path cleaning

#### Adjustment after replacement

Tape running adjustment

### Precaution

Take care not to damage the drum, tape guides, stationary heads during replacement.

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
4. Remove the cassette compartment.
   (Refer to section 3-3-24.)

**Note**

Stop washer is used for installation of pinch arm assembly. Do not reuse it. Install the new one (3-559-408-11) when replacing the pinch arm assembly.

### Tools

| | |
|---|---|
| • FWD back-tension measurement cassette | J-6323-190-A |
| • Stop washer insertion tool | J-6323-530-A |
| • Cleaning cloth | 3-184-527-01 |
| • Cleaning fluid | 9-919-573-01 |
| • Torque screwdriver bit (for M1.4) | J-6325-110-A |
| • Torque screwdriver (for 3 kg) | J-6325-400-A |

## Removal

### 1. Full-top sensor assembly removal

(Refer to section 3-3-22.)

### 2. Pinch arm assembly removal

(Refer to section 3-3-9.)

### 3. Cassette stopper removal

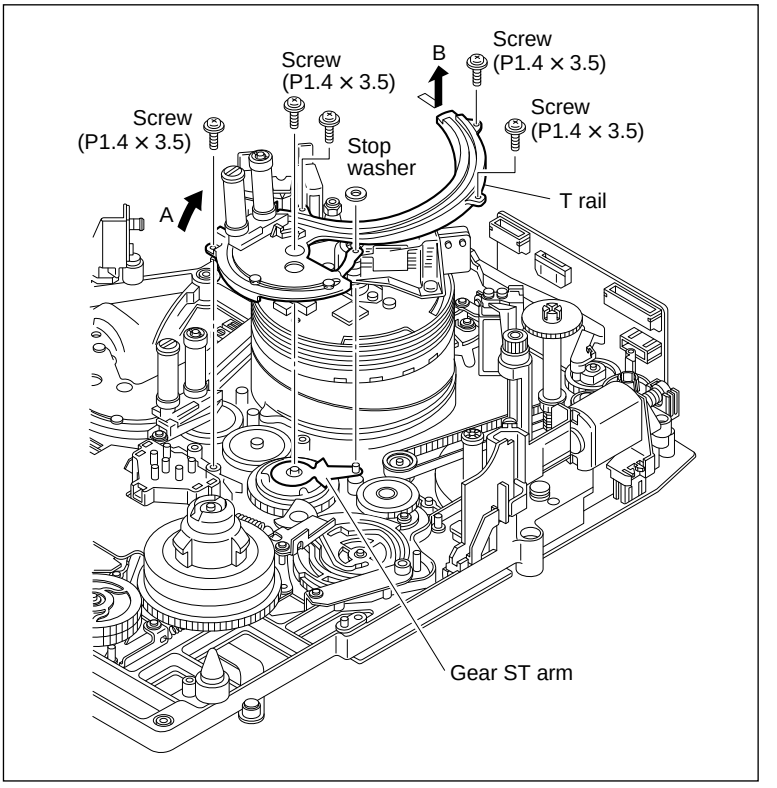
(Refer to section 3-3-17.)

### 4. T rail removal

(1) Remove the five screws and one stop washer.
(2) Lift the front part of the T rail slightly in the direction indicated by arrow A, then remove the T rail in the direction indicated by arrow B together with the T slider assembly.

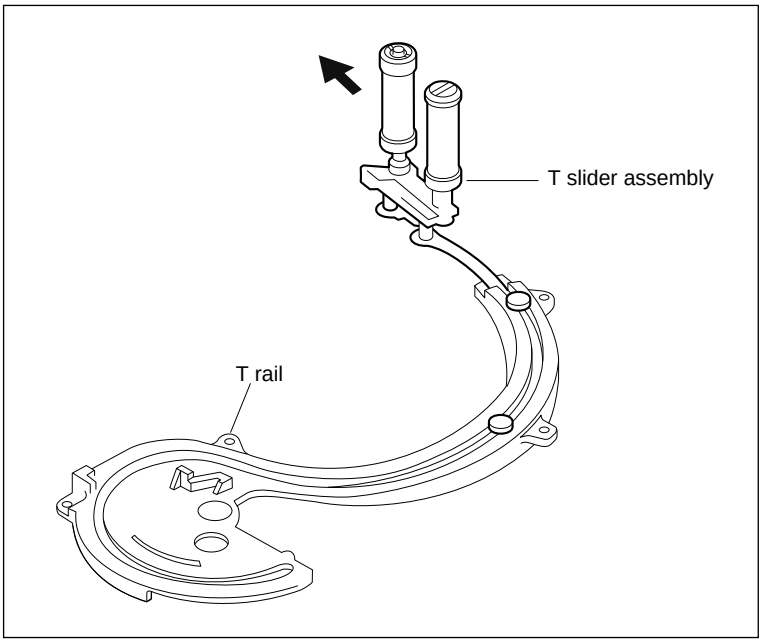
**Note**

Do not apply excessive force to the gear ST arm when removing the stop washer.



### 5. T slider assembly removal

Slide the T slider assembly backward and extract it from the T rail.




## Installation

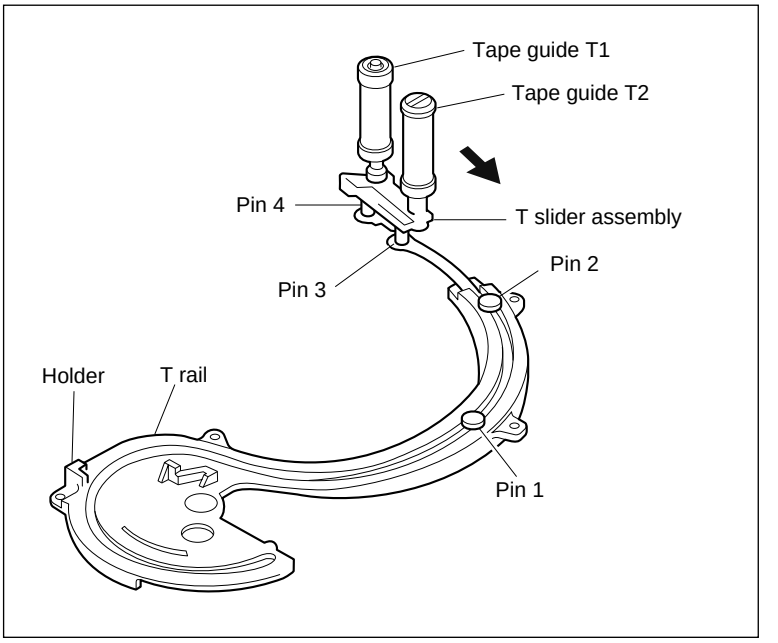
### 6. T slider assembly installation

Pass the pins of the T slider assembly through the groove of the T rail in the order of pins 1 to 4 and insert it until the T slider assembly is put in the holder of the T rail.

**Notes**

- Insert the T slider assembly correctly in the order of pins. (Tape guide T2 should be put in front of tape guide T1.)
- Do not apply excessive force to the T slider assembly and T rail during insertion.

After installation, confirm that the heads of each pin are not out of the groove of the rail.



### 7. T rail installation

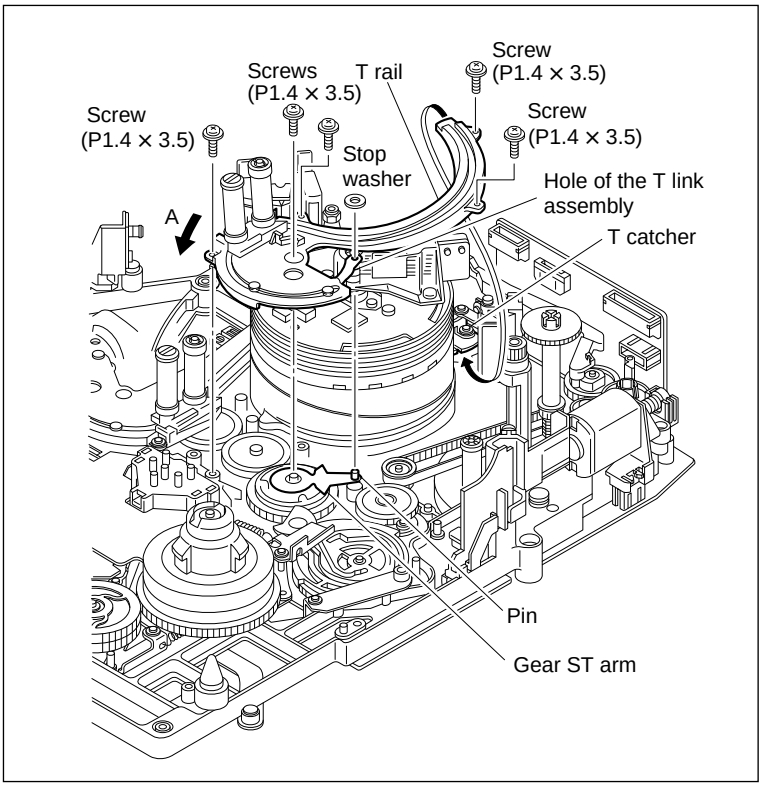
(1) Insert the hook at the back of the T rail under the T catcher and lower the front part in the direction indicated by arrow A.

(2) Pass the hole of the T link assembly through the pin of the gear ST arm and install it with a stop washer.

**Note**

Do not apply excessive force to the gear ST arm when installing the stop washer.

(3) Install the T rail with five screws.
[Tightening torque:
$9 \times 10^{-2}$ N•m (0.9 kgf•cm)]




### 8. Pinch arm assembly installation

(Refer to section 3-3-9.)

### 9. Cassette stopper installation

(Refer to section 3-3-17.)

### 10. Full-top sensor assembly installation

(Refer to section 3-3-22.)

### 11. Operation confirmation

Turn the warm wheel of the gear block assembly using a Phillips screwdriver and confirm that the threading/unthreading operation is performed smoothly. (Refer to section 3-1-4.)

**Note**

Do not turn the warm wheel excessively. This may damage the unit.

### 12. Heads and tape running path cleaning

Clean the portions below with cleaning cloth moistened with cleaning fluid.

- Video heads
- Tape running path of the upper drum
- Lead and tape running path of the lower drum
- All tape guides and pinch roller

After cleaning, wipe them with dry cloth.

---

**Adjustment after replacement**

### 13. Tape running adjustment

(Refer to section 4-2-1.)

## 3-3-20. Threading Arm Assembly Replacement

### Outline

#### Replacement

Tension regulator band assembly removal
Tension regulator assembly removal
Threading arm assembly removal
Threading arm assembly installation
Tension regulator assembly installation
Tension regulator band assembly installation
Tension regulator (S5) guide cleaning
Threading arm assembly (S4) guide cleaning

#### Adjustment after replacement

Tension regulator operation position check
FWD back-tension adjustment
Tape running adjustment

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
4. Remove the cassette compartment.
   (Refer to section 3-3-24.)

**Note**

Stop washer is used for installation of threading arm assembly. Do not reuse it.
Install the new one (3-559-408-11) when replacing the threading arm assembly.

### Tools

- Stop washer insertion tool J-6323-530-A
- FWD back-tension measurement cassette J-6323-890-A
- Cleaning cloth 3-184-527-01
- Cleaning fluid 9-919-573-01
- Torque screwdriver bit (for M1.4) J-6325-110-A
- Torque screwdriver (for 3 kg) J-6325-400-A

## Removal

### 1. Tension regulator band assembly removal

(Refer to section 3-3-12.)

### 2. Tension regulator assembly removal

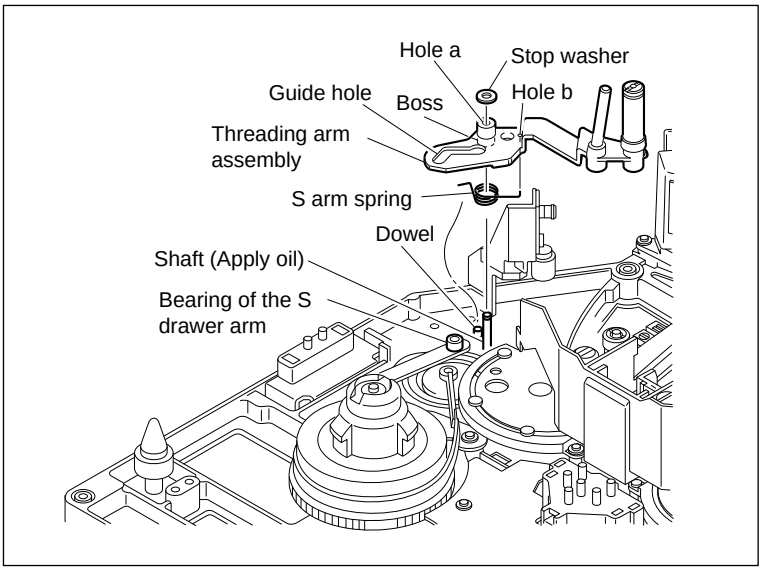
(Refer to section 3-3-12.)

### 3. Threading arm assembly removal

Remove the stop washer, then remove the threading arm assembly.

**Note**

The S arm spring is also removed simultaneously with when the threading arm assembly is removed. Be careful not to lose it.




## Installation

### 4. Threading arm assembly installation

(1) Apply oil (of 1/4 drop) to the shaft of the MD chassis.
(2) Install the S arm spring in the boss and hole “b” of the threading arm assembly.
(3) Put the bearing of the S drawer arm in the guide hole while passing hole “a” of the threading arm assembly through the shaft.
(4) Put the hook of the S arm spring on the dowel of the MD chassis.
(5) Install the threading arm assembly with a stop washer.

### 5. Tension regulator assembly installation

(Refer to section 3-3-12.)

### 6. Tension regulator band assembly installation

(Refer to section 3-3-12.)

### 7. Tension regulator (S5) guide cleaning

(Refer to section 3-3-12.)

### 8. Threading arm assembly (S4) guide cleaning

Clean the threading arm assembly (S4) guide with cleaning cloth moistened with cleaning fluid. After cleaning, wipe the threading arm assembly (S4) guide with dry cloth.

**Adjustment after replacement**

**9. Tension regulator operation position adjustment**

(Refer to section 4-1-2.)

**10. FWD back-tension adjustment**

(Refer to section 4-1-3.)

**11. Tape running adjustment**

(Refer to section 4-2-1.)

## 3-3-21. End Sensor Assembly Replacement

### Outline

#### Replacement

End sensor assembly removal
End sensor assembly installation

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

The end sensor assembly can be replaced with the cassette compartment installed in the unit.

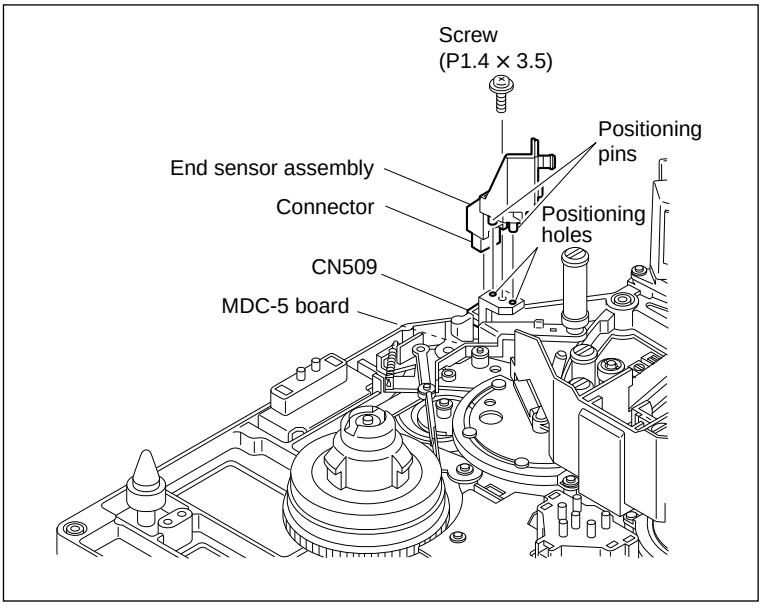
### Tools

- Torque screwdriver bit (for M1.4) J-6325-110-A
- Torque screwdriver (for 3 kg) J-6325-400-A

### Removal

#### 1. End sensor assembly removal

(1) Remove one screw securing the end sensor assembly.
(2) Remove the end sensor assembly while disconnecting connector CN509 on the MDC-5 board.




### Installation

#### 2. End sensor assembly installation

(1) Connect the connector of the end sensor assembly to connector CN509 on the MDC-5 board while aligning the two positioning pins at the bottom of the end sensor assembly with the positioning holes of the MD chassis.
(2) Tighten the screw for the end sensor assembly.
   [Tightening torque:
   $9 \times 10^{-2}$ N•m (0.9 kgf•cm)]

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## 3-3-22. Full-Top Sensor Assembly Replacement

### Outline

#### Replacement

Full-top sensor assembly removal
Full-top sensor assembly installation

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

The full-top sensor assembly can be replaced with the cassette compartment installed in the unit.

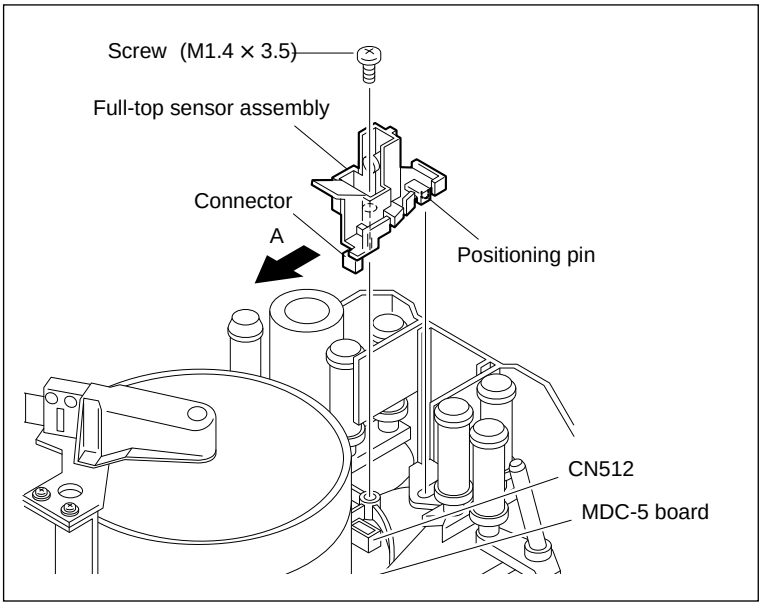
### Tools

- Torque screwdriver bit (for M1.4) J-6325-110-A
- Torque screwdriver (for 32 kg) J-6325-400-A

### Removal

#### 1. Full-top sensor assembly removal

(1) Remove one screw securing the full-top sensor assembly.
(2) Remove the full-top sensor assembly while disconnecting connector CN512 on the MDC-5 board.




### Installation

#### 2. Full-top sensor assembly installation

(1) Connect the connector of the full-top sensor to connector CN512 on the MDC-5 board while aligning the positioning pin at the bottom of the full-top sensor assembly with the longitudinal hole of the cassette stopper.
(2) Push the full-top sensor holder in the direction indicated by arrow A so that its tip strikes against the surface of the lower drum and tighten the screw for the full-top sensor assembly.
[Tightening torque:
$9 \times 10^{-2}$ N•m (0.9 kgf•cm)]

## 3-3-23. Top Sensor Assembly Replacement

### Outline

#### Replacement

Cassette compartment removal
Top sensor assembly removal
Top sensor assembly installation
Cassette compartment installation

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

### Tools

- Torque screwdriver bit (for M1.4) J-6325-110-A
- Torque screwdriver (for 3 kg) J-6325-400-A

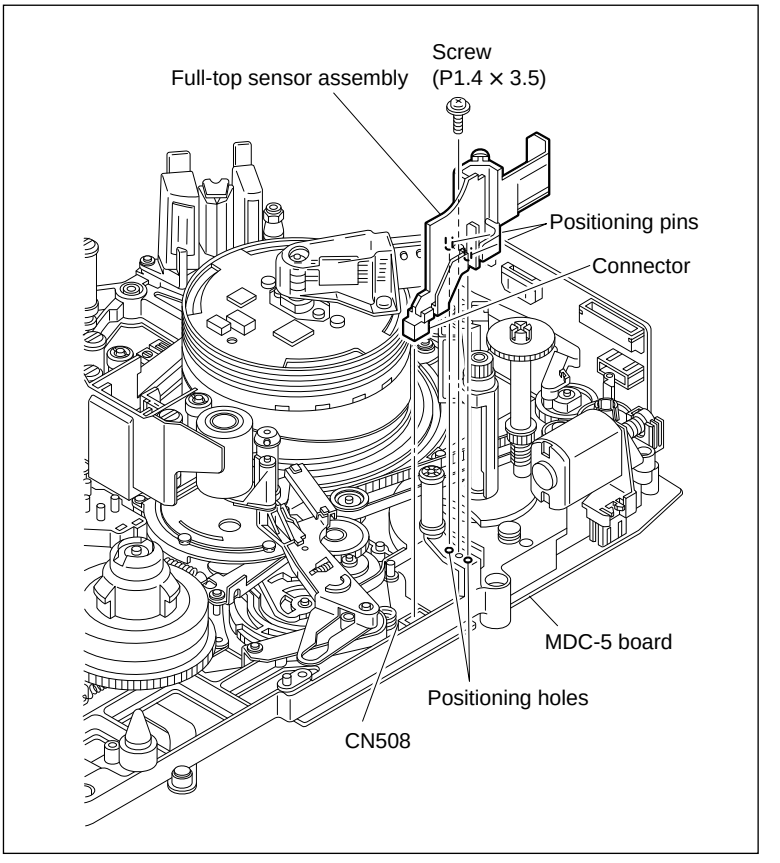
### Removal

#### 1. Cassette compartment removal

(Refer to section 3-3-24.)

#### 2. Top sensor assembly removal

(1) Remove one screw securing the top sensor assembly.
(2) Remove the top sensor assembly while disconnecting connector CN508 on the MDC-5 board.




### Installation

#### 3. Top sensor assembly installation

(1) Connect the connector of the top sensor assembly to connector CN508 on the MDC-5 board while aligning the two positioning pins at the bottom of the top sensor assembly with the positioning holes of the MD chassis.
(2) Tighten the screw for the top sensor assembly.
   [Tightening torque:
   $9 \times 10^{-2}$ N•m (0.9 kgf•cm)]

#### 4. Cassette compartment installation

(Refer to section 3-3-24.)

## 3-3-24. Cassette Compartment Replacement

### Outline

### Replacement

Cassette compartment removal
Cassette compartment installation

### Preparations

1. Turn off the power.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

The cassette compartment can be removed even if it is in the up or down state.

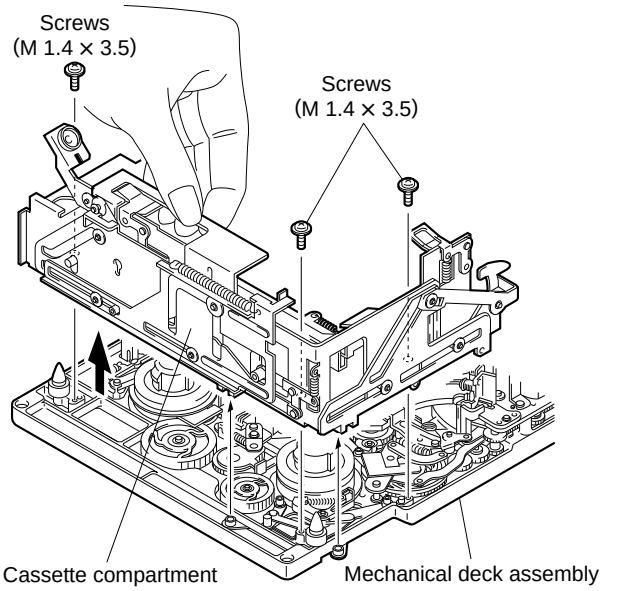
### Tools

- Torque screwdriver bit (for M1.4) J-6325-110-A
- Torque screwdriver (for 3 kg) J-6325-400-A

### Removal

#### 1. Cassette compartment removal

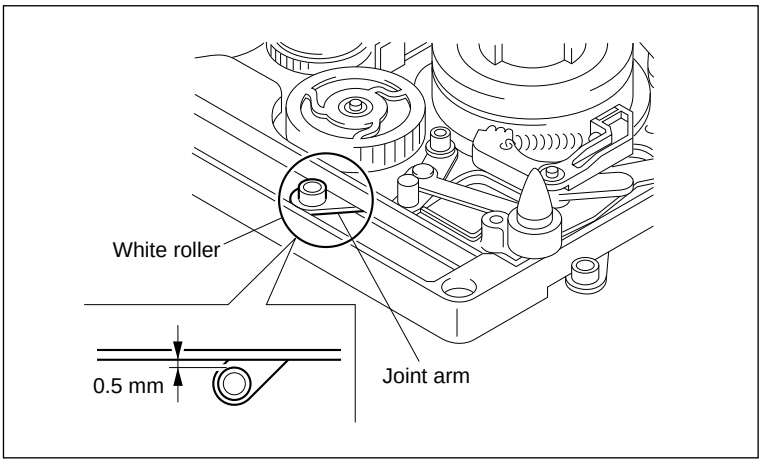
Remove the three screws, hold the position of the cassette compartment shown in the figure, and remove it in the direction indicated by the arrow.



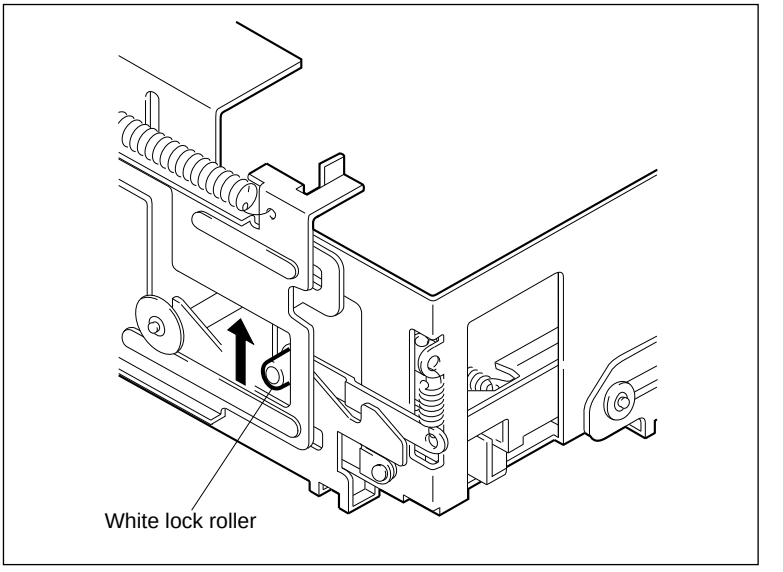
## Installation

### 2. Cassette compartment installation

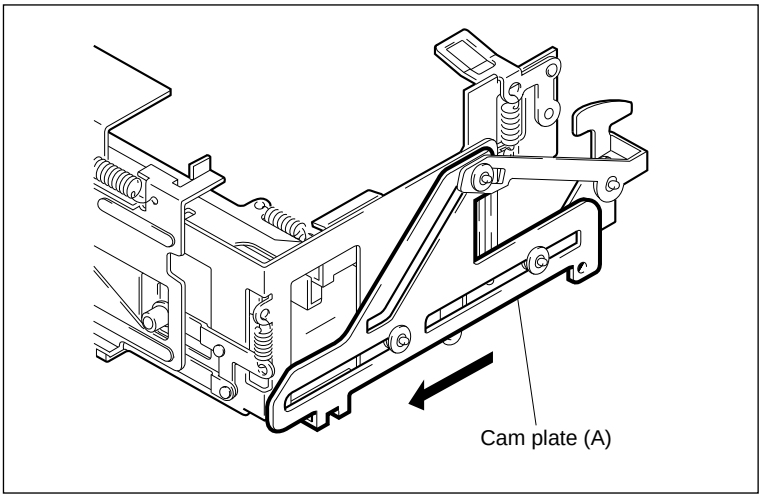
(1) Adjust the joint arm position so that the clearance between the outer circumference of the joint arm's white roller and the end face of the mechanical chassis assembly is 0.5 mm.




(2) Raise the white lock roller of the cassette compartment upward and put it into the up state.



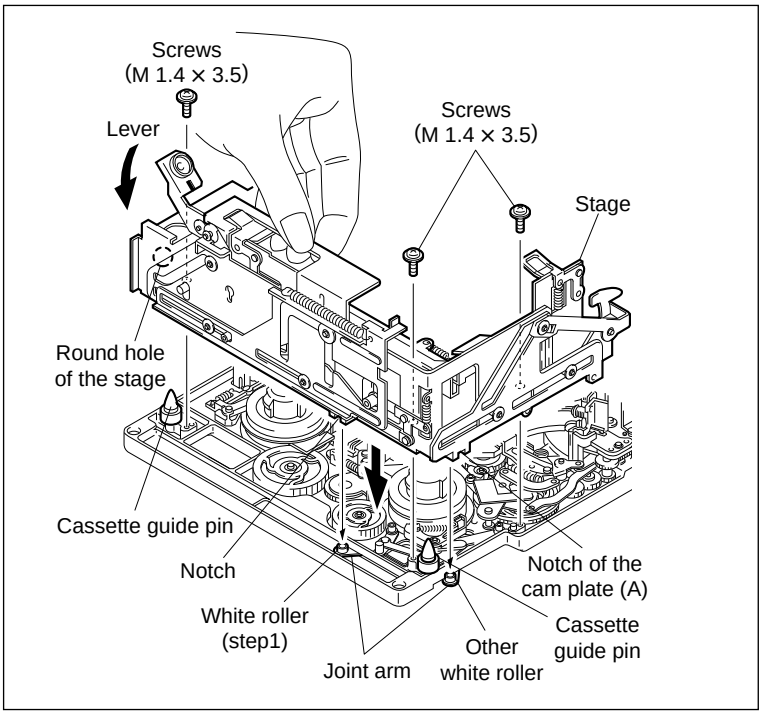

(3) Move the cam plate (A) on the right side panel of the cassette compartment in the direction indicated by the arrow with fingers as far as it will go.



(4) Hold the position of the cassette compartment shown in the figure and install it in the chassis so that the two cassette guide pins are put in the round holes of the stage. At that time, confirm that the other white roller of the eject arm of which position was adjusted in step (1) is put in the notch of the cam plate (A) on the right side panel.

(5) Push the lever of the cassette compartment and confirm that the stage smoothly moves up and down. If not, reconfirm steps (1) and later.

(6) Install the cassette compartment with three screws.
[Tightening torque:
$9 \times 10^{-2}$ N•m (0.9 kgf•cm)]



## 3-3-25. Removal and Installation of Mechanical Deck Assembly

### Outline

#### Removal and installation

Mechanical deck assembly removal
Mechanical deck assembly installation

#### Adjustment after installation

Tape running adjustment

### Preparations

1. Turn off the power.
2. Remove the front lid, inside panel, and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

The mechanical deck assembly can be removed/installed with the cassette compartment installed in the unit.

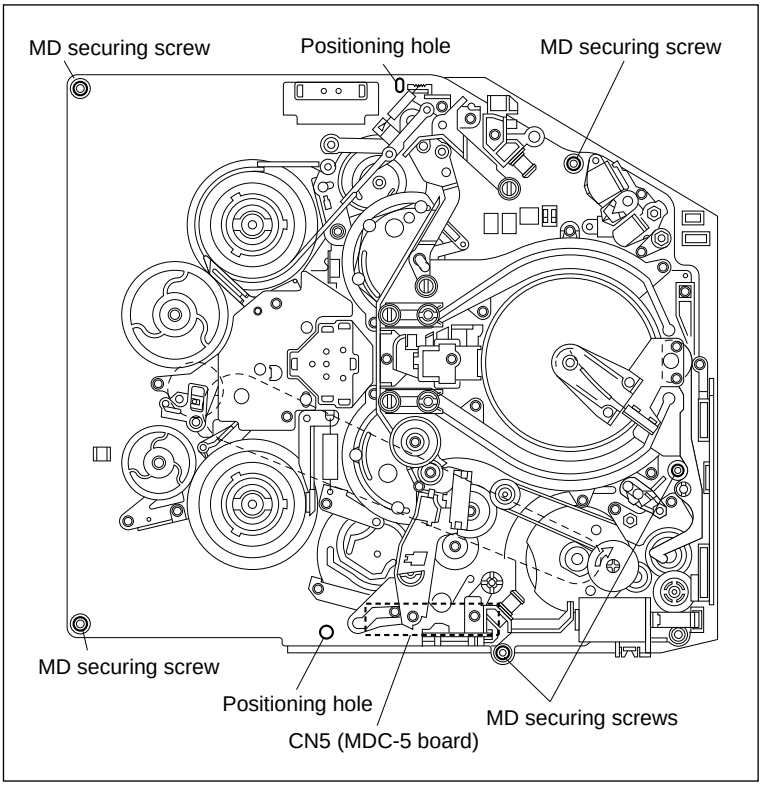
### Tools

- Torque screwdriver bit (across 1.5 mm) J-6326-120-A
- Torque screwdriver (for 3 kg) J-6325-400-A

### Removal

#### 1. Mechanical deck assembly removal

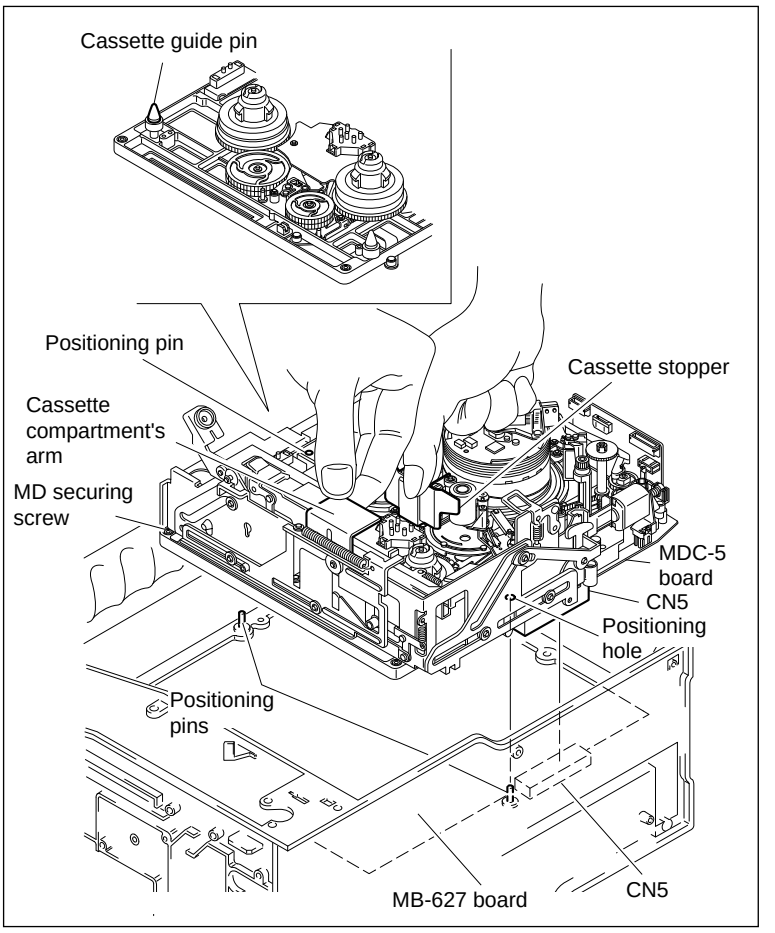
(1) Fully loosen the five MD securing screws (with stopper) using a hexagonal bit.



(2) Hold the cassette stopper and the cassette compartment's arm and lift the mechanical deck assembly gently while extracting connector CN5 at the back of the MDC-5 board.

**Note**

If no cassette compartment is installed, hold the cassette stopper and cassette guide pin to lift.

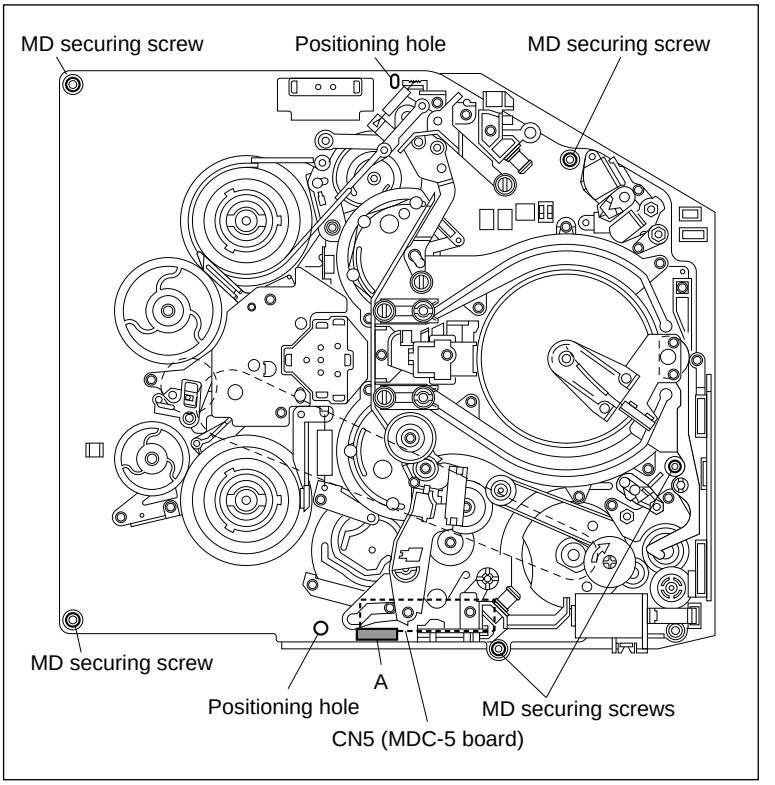



## Installation

### 2. Mechanical deck assembly installation

(1) Align the positioning holes of the mechanical deck assembly with the positioning pins of the main unit and connect connector CN5 at the back of the MDC-5 board to connector CN5 on the MB-627 board.
Be sure to push the portion A to securely connect.

(2) Tighten the five MD securing screws.




## Adjustment after replacement

### 3. Tape running adjustment

(Refer to section 4-2-1.)

# 3-4. Removal and Installation of CCD Block (Only for DNW-7/7P/90/90P/90WS/90WSP)

**Note**

Replacement CCD unit BKNW series be available through a sales route.

## Outline

### Removal and installation

Front assembly removal
Filter knob removal
CCD block removal
CCD block installation
Filter knob installation
Front assembly installation

### Adjustment after installation

Tape running adjustment
AD clock phase check

## Preparations

1. Turn off the power.
2. Open the inside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

## Tools

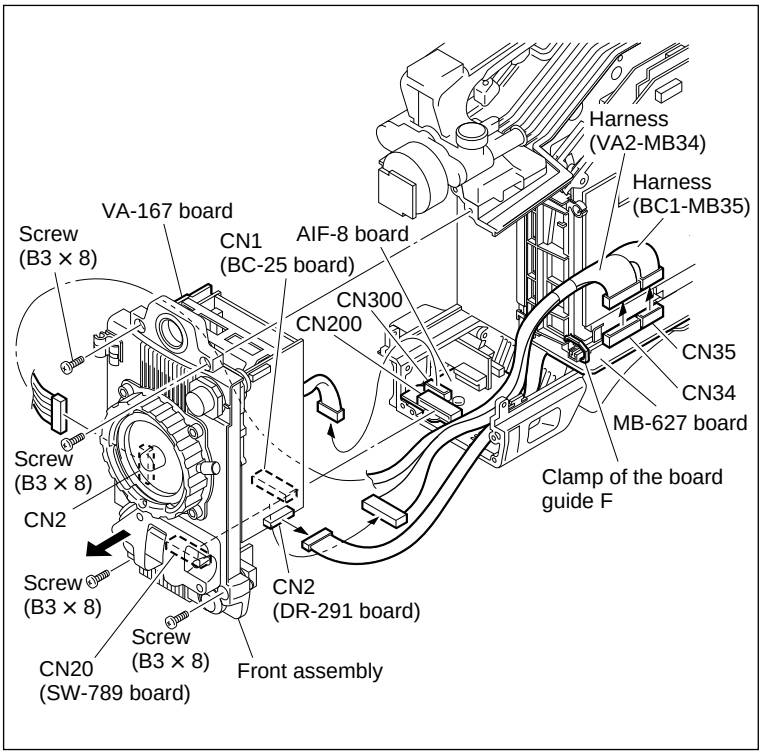
| | |
|---|---|
| • Torque screwdriver bit (for M1.4) | J-6325-110-A |
| • Torque screwdriver bit (for M2) | J-6325-380-A |
| • Torque screwdriver (for 3 kg) | J-6325-400-A |
| • Screwdriver hexagon bit (45) (across 0.89 mm) | J-6322-420-3 |
| • Screwdriver hexagon bit (across 2.5 mm) | J-6530-100-A |
| • Cleaning cloth | 3-184-527-01 |
| • Cleaning fluid | 9-919-573-01 |

## Removal

### 1. Front assembly removal

(1) Unfasten the harnesses VA2-MB34 and BC1-MB35 from the clamp of the board guide F.
(2) Disconnect the three connectors shown below.
- CN34, CN35/MB-627 board
- CN2/DR-291 board

(3) Remove the four screws securing the front assembly to the unit.
(4) Pull out the front assembly in the direction indicated by the arrow, and disconnect the connector CN20 on the SW-789 board from CN200 on the AIF-8 board.
(5) Disconnect the connector CN300 on the AIF-8 board, then remove the front assembly.
(6) Disconnect the connectors CN1 on the BC-25 board and CN2 on the VA-167 board.

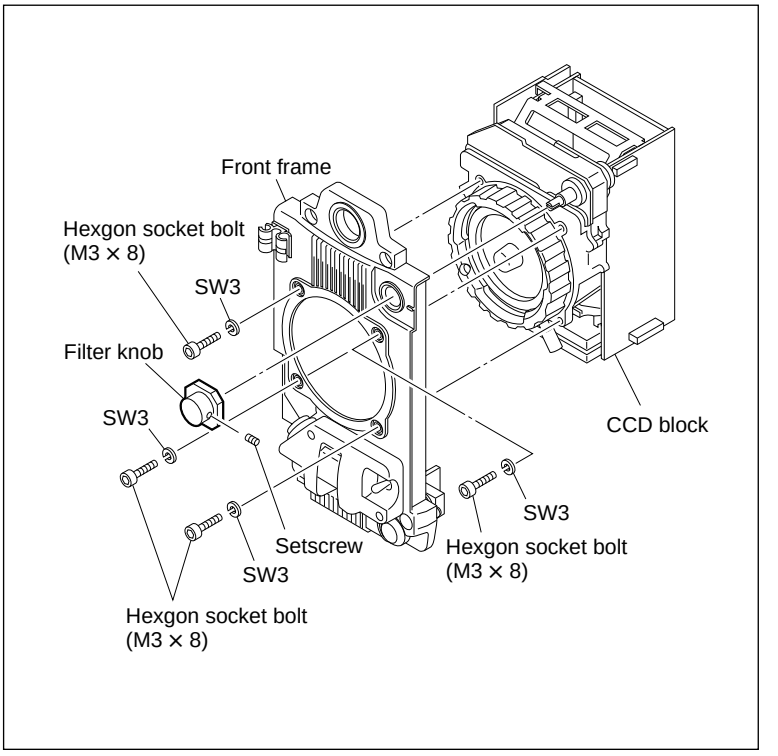



### 2. Filter knob removal

Remove the setscrew (with hole of 0.89 mm in width across flat) to remove the filter knob.

### 3. CCD block removal

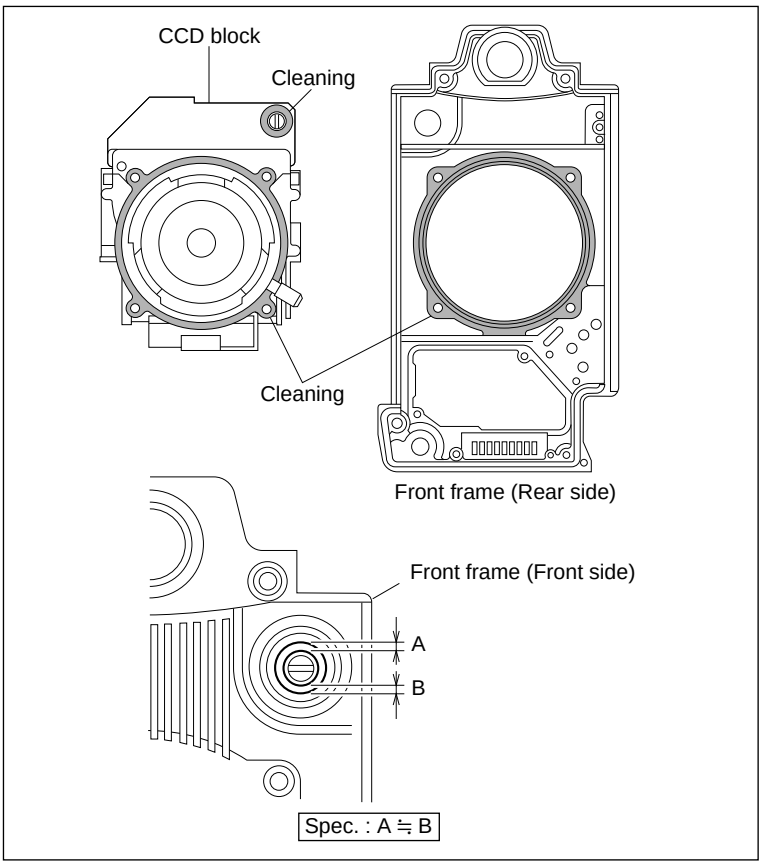
Remove the four setscrews (with hole of 2.5 mm in width across flat) to remove the CCD block from the front frame.



## Installation

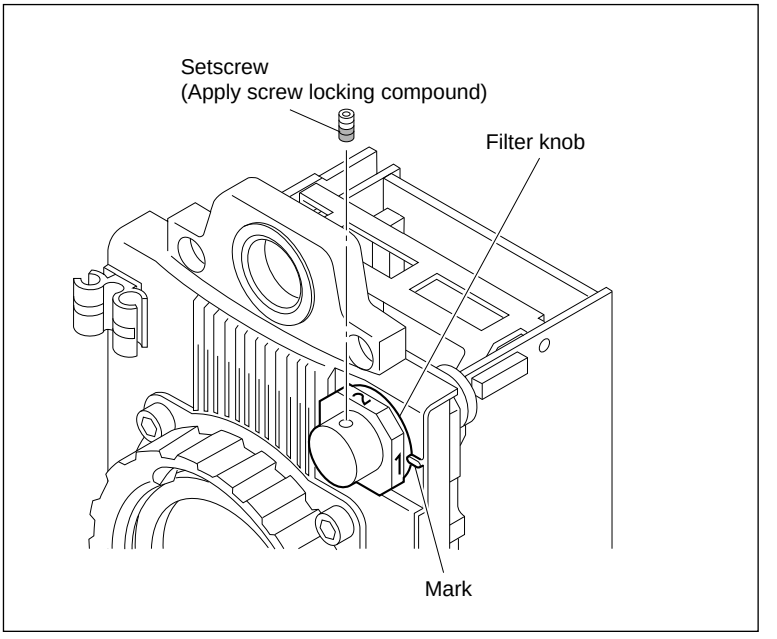
### 4. CCD block installation

(1) Connect the harnesses that were removed in procedure 3 to the CCD block.
(2) Clean both contact surfaces of the CCD block and front frame using cleaning cloth moistened with cleaning fluid.
(3) Temporarily secure the CCD unit to the front frame with the four screws.
(4) Tighten the preceding screws so that the gap between the front frame hole and the filter shaft satisfies specifications.
[Tightening torque: $80 \times 10^{-2}$ N•m (8.2 kgf•cm)]




### 5. Filter knob installation

(1) Rotate the filter shaft until the clear filter (straight through filter) can be seen from the lens mount.
(2) Align the indication of number "1" on the filter knob with the mark on the front frame. And then fix the knob with the setscrew to which a locking fluid was applied beforehand.
[Tightening torque: $20 \times 10^{-2}$ N•m (2.0 kgf•cm)]
(3) Rotate the filter knob and check that it moves smoothly.




### 6. Front assembly installation

(1) Connect the four connectors that were disconnected in procedure 1.
(2) Install the front assembly to the unit with the four screws.
[Tightening torque: $80 \times 10^{-2}$ N•m (8.2 kgf•cm)]

## Adjustment after replacement

### 7. Tape running adjustment

(Refer to section 4-2-1.)

### 8. AD clock phase check

(Refer to section 8-3.)

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# 3-5. Fan Motor Replacement

## Outline

### Replacement

DC-DC converter assembly removal
Fan motor removal
Fan motor installation
DC-DC converter assembly installation

## Basic knowledge

Fan motor operates only when the temperature inside the unit rises. If an alert sounds due to a failure of fan, the fan replacement is required.

## Preparations

1. Turn off the power.
2. Open the inside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
3. Remove the outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
4. Remove the plug-in boards.
   (Refer to section 1-8 in Part 1 of the Maintenance Manual.)

## Tools

- Torque screwdriver bit (for M1.4) J-6325-110-A
- Torque screwdriver bit (for M2) J-6325-380-A
- Torque screwdriver (for 3 kg) J-6325-400-A

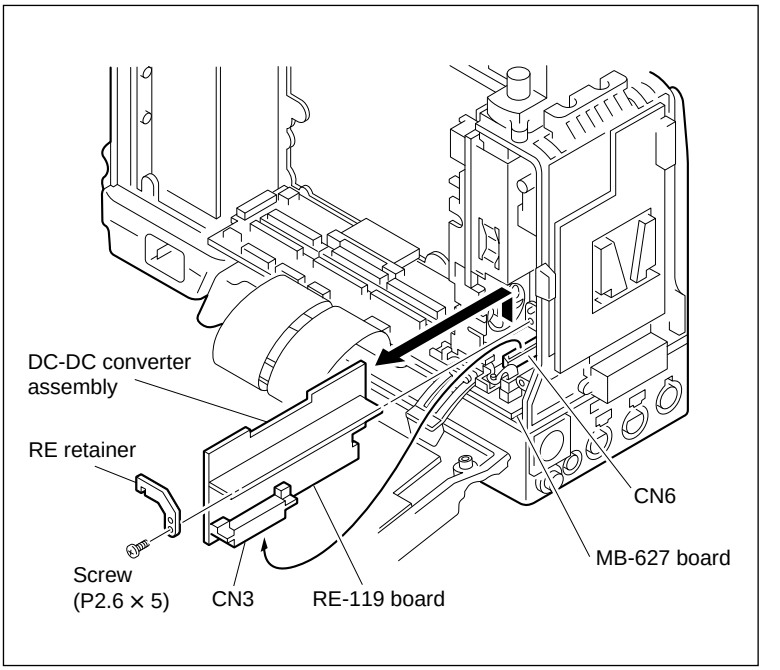
## Removal

### 1. DC-DC converter assembly removal

(1) Remove the screw to remove the RE retainer.
(2) Disconnect the connector CN3 on the RE-119 board from CN6 on the MB-627 board. Remove the DC-DC converter assembly in the direction indicated by the arrow.

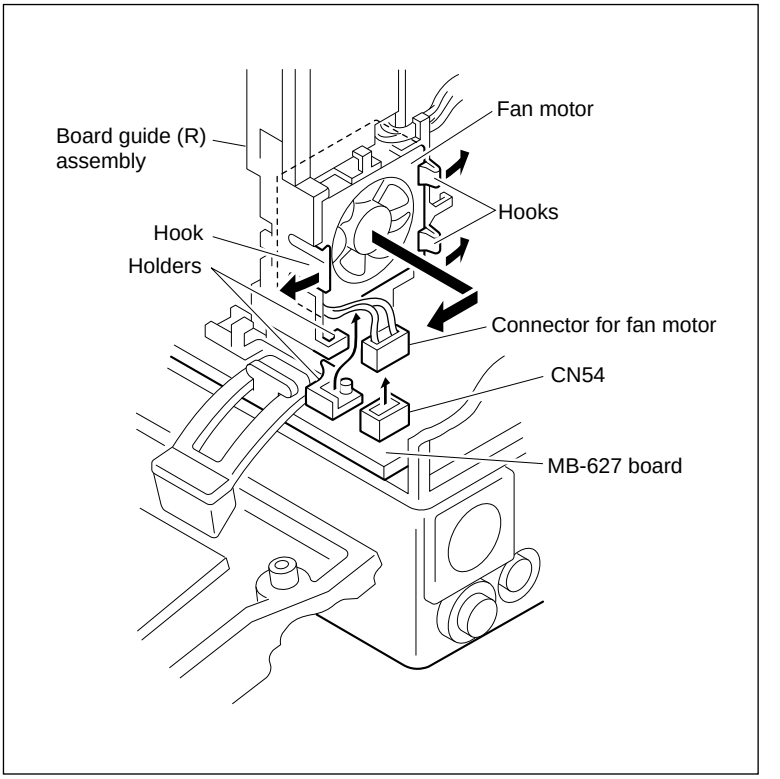
**Note**

In removal, take care that the DC-DC converter assembly is not caught on harnesses around.




### 2. Fan motor removal

(1) Disconnect the connector for fan motor from CN54 on the MB-627 board, then remove the harness from the two holders of the board guide (R) assembly.
(2) Unhook the board guide (R) assembly at three hooks, then remove the fan motor in the direction indicated by the arrow.



## Installation

### 3. Fan motor installation

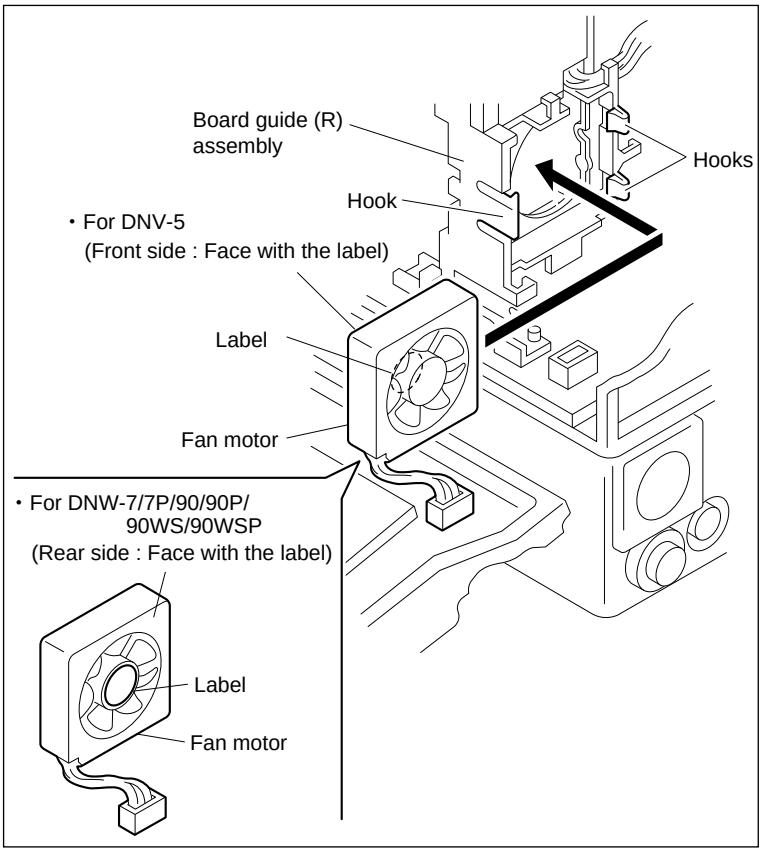
(1) Install the fan motor to the board guide (R) assembly as shown in the figure.

**Note**

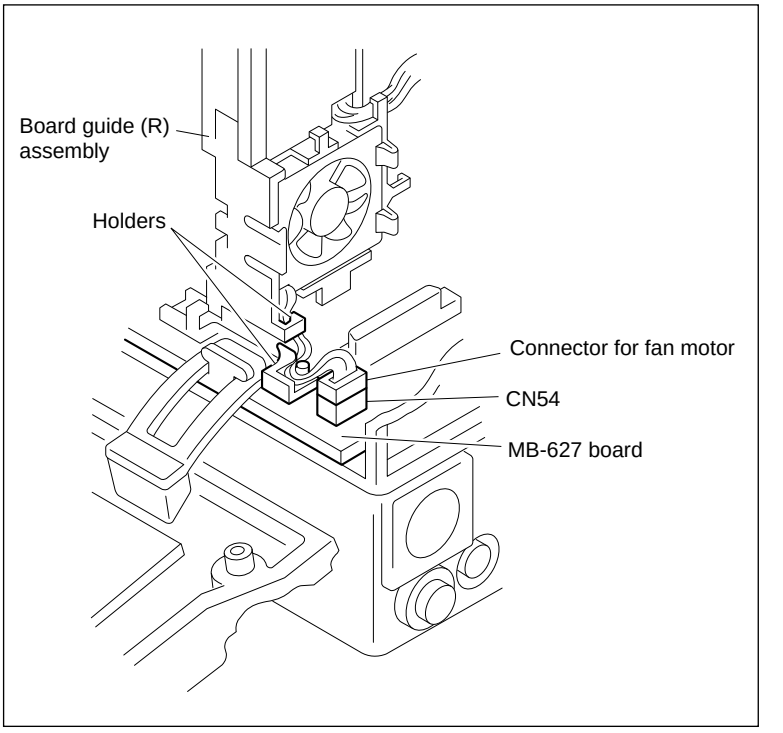
In installation, fan motor should be positioned as follows and be sure to hook the fun motor on the board guide (R) assembly at three hooks.

DNV-5: The label on the fun motor should face forward and the harness should face down.

DNW-7/7P/90/90P/90WS/90WSP: The label on the fun motor should face backward and the harness should face down.




(2) Pass the fan motor harness through the two holders of the board guide (R) assembly, then connect the connector for fan motor to CN54 on the MB-627 board.



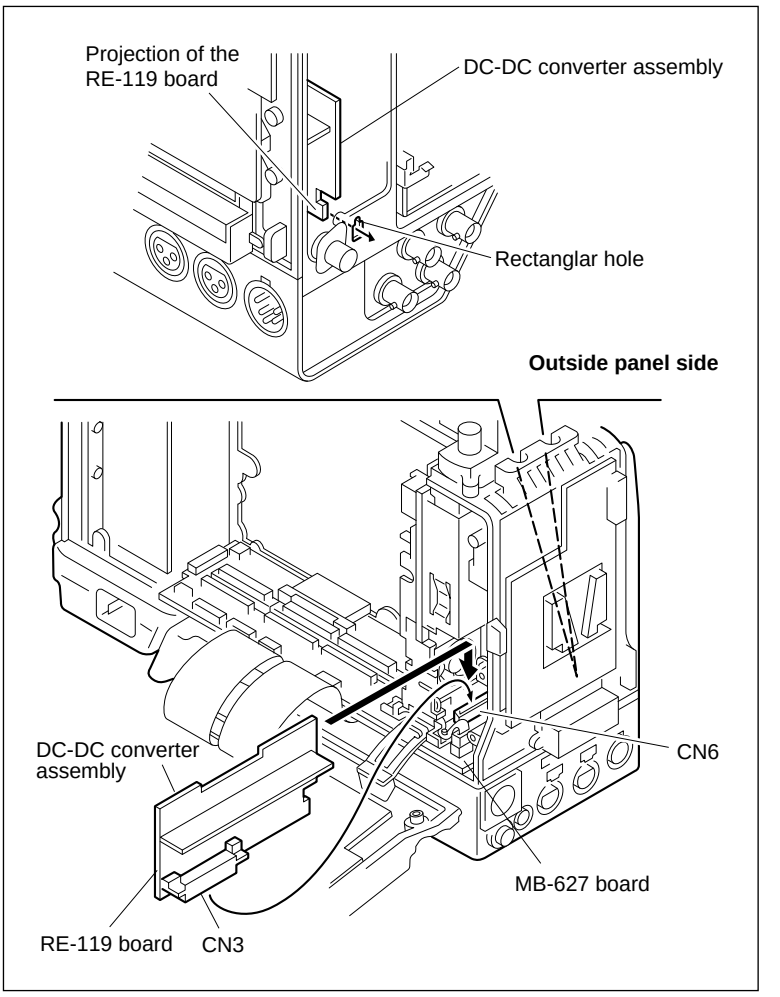
### 4. DC-DC converter assembly installation

(1) Insert the DC-DC converter assembly in the direction indicated by the arrow and pass the projection of the RE-119 board through rectangular hole of the chassis.

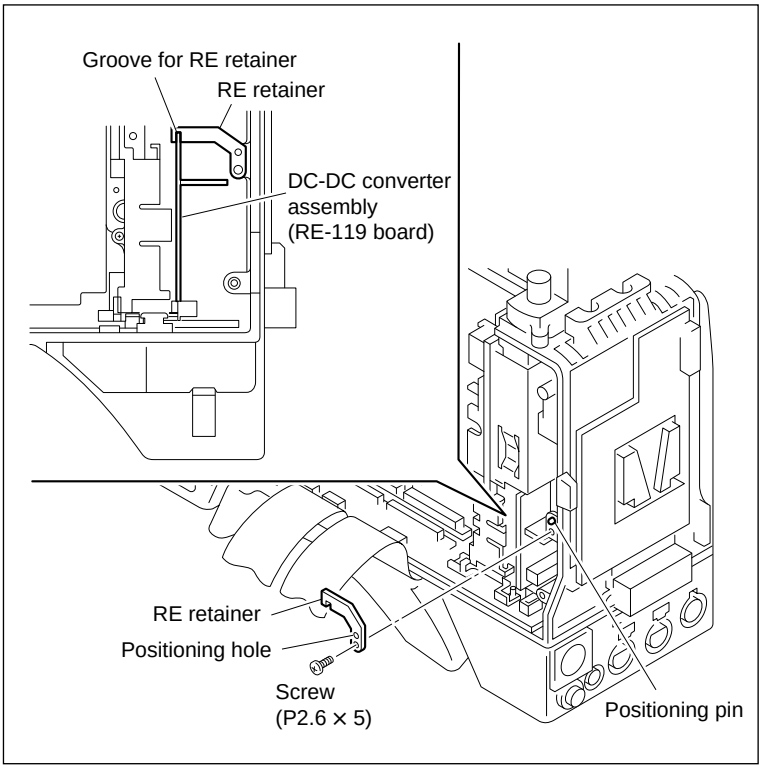
**Note**

In installation, take care that the DC-DC converter assembly is not caught on harnesses around.

(2) Connect the connector CN3 on the RE-119 board to CN6 on the MB-627 board.




(3) Install the RE retainer to the unit to the chassis with the screw.
[Tightening torque: $53 \times 10^{-2}$ N•m (5.4 kgf•cm)]



# Section 4
# Mechanical Alignment

## 4-1. Mechanical Adjustment

### 4-1-1. Reel Table Height Adjustment

**Precautions**

- The reel table height is the reference of a tape running system.
  Perform the reel table height adjustment after the reel table is replaced.
- Three polywashers are used each at the top and bottom of the S and T reel tables.
  The polywashers at the top of the reel table are used for spare parts during reel table replacement. Be careful not to lose or damage them.
  Polywasher t 0.25 (one sheet): 3-303-961-11
  Polywasher t 0.13 (2 sheets): 3-303-961-01
- For the replacement of the S and T reel tables, refer to section 3-3-8.

**Preparations**

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
4. Remove the cassette compartment.
   (Refer to section 3-3-24.)

**Tools**

- Reel table height adjustment tool J-6324-150-A
- Cassette reference plate J-7032-610-A

## Adjustment

### 1. Cassette reference plate installation

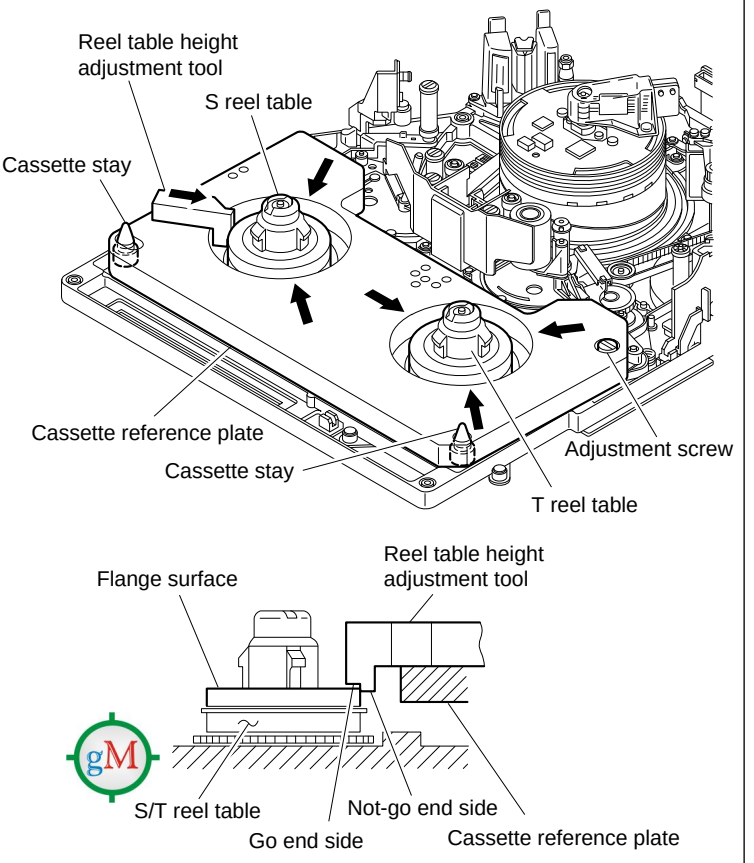
As shown in the figure, align the cassette reference plate with two cassette stays and install it. Turn the adjustment screw of the cassette reference plate and adjust so that no play occurs in the cassette reference plate.

### 2. Reel table height confirmation

Move the reel table height adjustment tool to the flange surface of the S and T reel tables at intervals of approximately 120 degrees as shown in the figure and confirm that the specifications are satisfied.
If the specifications are not satisfied, adjust according to procedure 3.

### 3. Reel table height adjustment

Increase or decrease the number of polywashers at the bottom of the reel table for adjustment.
When the reel table height is lower than the specified value;
Insert the polywashers at the top of the reel table into the bottom of the reel table.
When the reel table height is higher than the specified value;
Insert the polywashers at the bottom of the reel table into the top of the reel table.
Reconfirm that the specifications are satisfied.




Specifications : The go end side of the gauge slides over the frange of the reel table.
The not-go end side of the gauge blocks the frange of the reel table.

- Deference between go end side and not-go end side : 0.2 mm

## 4-1-2. Tension Regulator Operating Position Adjustment

### Precaution

Perform the tension regulator operating position adjustment when the tension regulator band assembly and/or S reel table assembly are replaced.

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Turn off the power.
3. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

### Tools

- Torque screwdriver bit (for M2) J-6325-380-A
- Torque screwdriver (for 3 kg) J-6325-400-A
- Parallel pin 3-703-358-08
- Thickness gauge

### Confirmation

#### 1. Mode setting

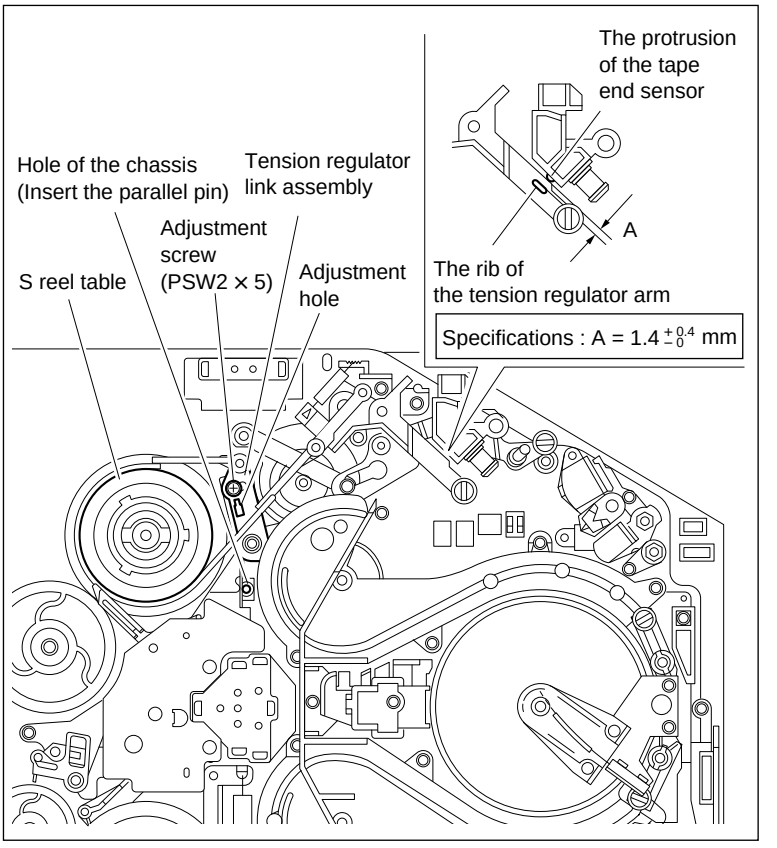
Turn the worm wheel of the manual eject assembly to put the unit into the threading end state.
(Refer to section 3-1-4.)

**Note**

Do not turn the worm wheel more than required.
This may damage the unit.

### 2. Tension regulator operating position confirmation

Insert the parallel pin into the hole of the chassis shown in the figure. Confirm that clearance A between the rib of the tension regulator arm and the protrusion of the tape end sensor satisfies the specifications.
If the specifications A are not satisfied, adjust according to procedure 3.


The protrusion of the tape end sensor
Hole of the chassis (Insert the parallel pin)
Tension regulator link assembly
Adjustment screw (PSW2 × 5)
S reel table
Adjustment hole
A
The rib of the tension regulator arm
Specifications : A = 1.4 +0.4 -0 mm

## Adjustment

### 3. Tension regulator operating position adjustment

(1) Loosen the adjustment screw of the tension regulator link assembly by 1/2 turn.
(2) Insert the 3-mm flatblade screwdriver into the adjustment hole of the tension regulator link assembly and adjust the position of the tension regulator link assembly so that the specifications are satisfied.
(3) With the screwdriver put in the state of step (2) tighten the adjustment screw of the tension regulator link assembly.
[Tightening torque:
$20 \times 10^{-2}$ N•m (2.0 kgf•cm)]
(4) Check that the tension regulator operating position in accordance with procedure 2 meets the specifications.
(5) Extract the parallel pin inserted in procedure 2.

### 4. Mode cancellation

Turn the worm wheel of the manual eject assembly to put the unit into the unthreading end state. (Refer to section 3-1-4.)

### 5. S5 tape guide height confirmation

(Refer to section 4-2-1.)

### 6. FWD back tension adjustment

(Refer to section 4-1-3.)

## 4-1-3. FWD Back Tension Adjustment

### Precaution

Perform the FWD back tension adjustment when the tension regulator band assembly or S reel table assembly are replaced or when the tension regulator operating position adjustment is performed.

### Preparations

1. Confirm that the unit is in the unthreading end state.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

It is recommended to perform this adjustment with the cassette compartment installed in the unit. If the cassette compartment is not installed, block the photointerrupter (cassette compartment lock switch) mounted on the MDC-5 board with black paper and put the unit into the cassette lock state. Moreover, place a weight for adjustment so that the FWD back tension measurement cassette is not floated.
Refer to “3-1-3. Threading End State/Unthreading End State” on the cassette compartment lock switch.

### Tool

- FWD back tension measurement cassette J-6323-890-A

## Confirmation

### 1. Entering the REC state

(1) Turn on the power.
(2) Insert a FWD back tension measurement cassette and press the REC key to enter the REC state.

### 2. FWD back tension confirmation

Confirm that the S meter value of a FWD back tension measurement cassette satisfies the specifications.
If the specifications are not satisfied, perform procedures 3 and later after confirming that the value is higher or lower than the specifications.

## Adjustment

### 3. Entering the EJECT state

(1) Press the REC key to cancel the REC state.
(2) Press the EJECT key and eject the FWD back tension measurement cassette.

### 4. Back tension adjustment

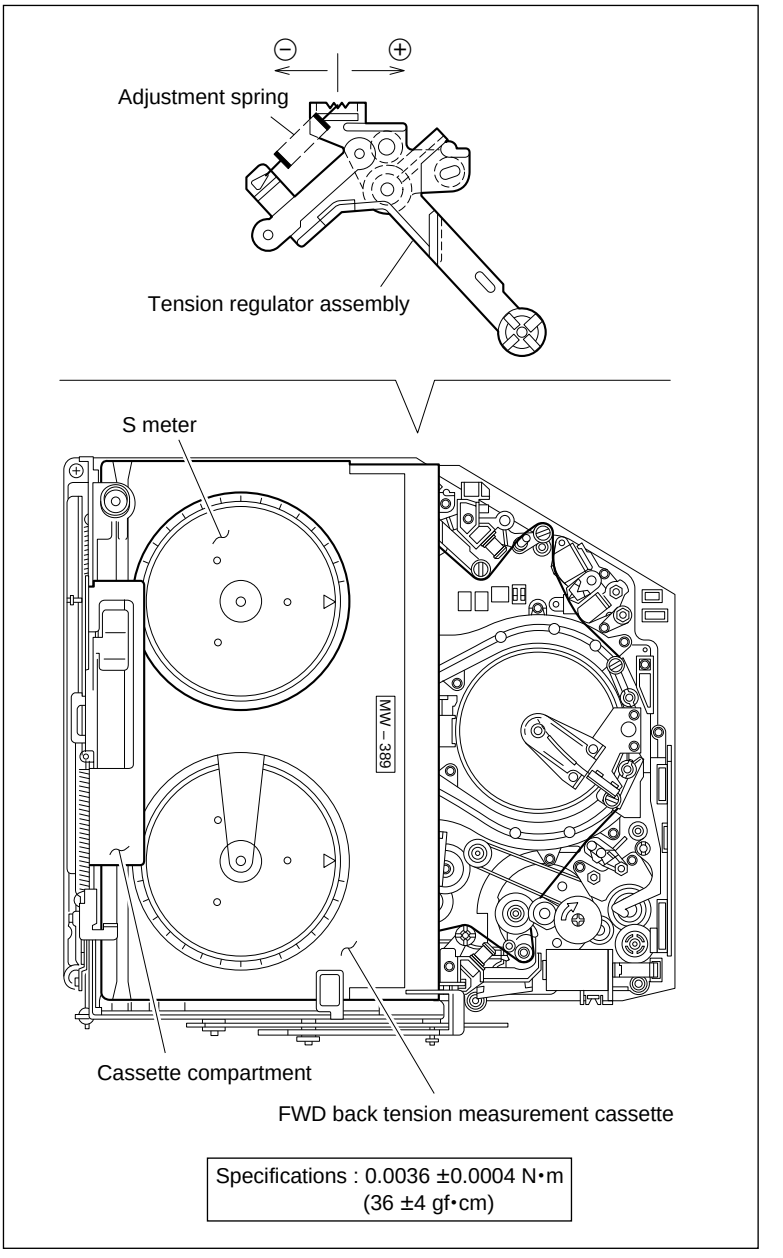
Change the position where the adjustment spring of the tension regulator assembly is put.

Adjustment method

- When the back tension is higher than the specifications, shift the spring in the minus (–) direction.
- When the back tension is lower than the specifications, shift the spring in the plus (+) direction.

### 5. FWD back tension confirmation after adjustment

Perform procedures 1 and 2 of confirmation and confirm that the specifications are satisfied.



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## 4-1-4. Brake Torque Confirmation

### Precaution

Confirm the brake torque when the T soft brake assembly and/or T reel table assembly are replaced.

### Preparation

1. Confirm that the unit is in the unthreading end state.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

**Note**

It is recommended to perform this adjustment with the cassette compartment installed in the unit. If the cassette compartment is not installed, block the photointerrupter (cassette compartment lock switch) mounted on the MDC-5 board with black paper and put the unit into the cassette lock state. Moreover, place a weight for adjustment so that the FWD back tension measurement cassette is not floated.

### Tool

- FWD back tension measurement cassette J-6323-890-A

## Confirmation

### 1. Setting

(1) Turn on the power.
(2) Insert a FWD back tension measurement cassette.
(3) Set DIP switch S110-1 on the MDC-5 board to ON.
The LED (D103) then lights.
(4) Press switch S108 on the MDC-5 board one time.
Confirm that the LED (D0) on the MDC-5 board light after switch S108 is pressed.
(5) Press the REW button. The unit then enters the REV ×1 state.

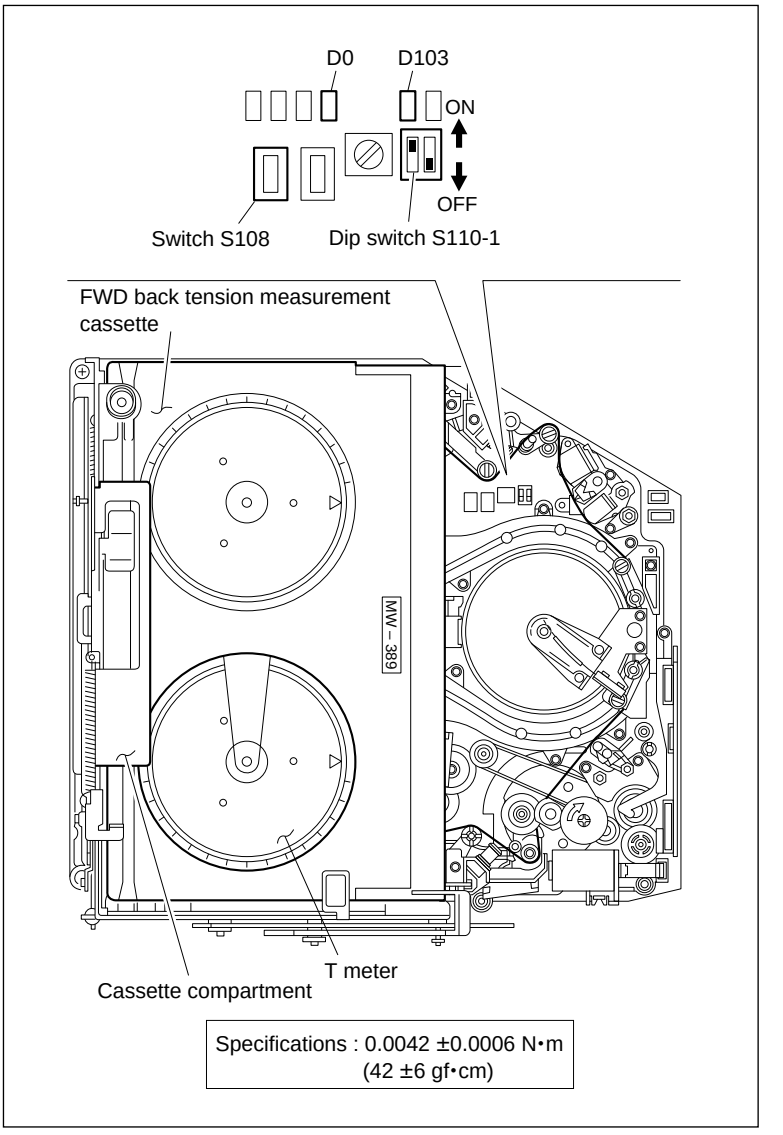
### 2. T brake torque confirmation

Confirm that the T meter value of a FWD back tension measurement cassette satisfies the specifications.

When the specifications are not satisfied;
- Confirm that the T soft brake assembly is installed correctly.
- Replace the T soft brake assembly. (Refer to section 3-3-1.)

### 3. Adjustment mode cancellation

(1) Put the unit into the STOP state.
(2) Set DIP switch S110-1 on the MDC-5 board to OFF.
Confirm that the LED (D103) turned on in step (3) of procedure 1 goes off.



## 4-1-5. Timing Belt (Reel) Tension Adjustment

### Precaution

Perform the belt tension adjustment when the reel drive gear assembly, capstan motor and/or timing belt (reel) are replaced.

### Preparation

1. Confirm that the unit is in the unthreading end state.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)

### Tools

- Torque screwdriver (for M1.4) J-6325-110-A
- Torque screwdriver (for 3 kg) J-6325-400-A

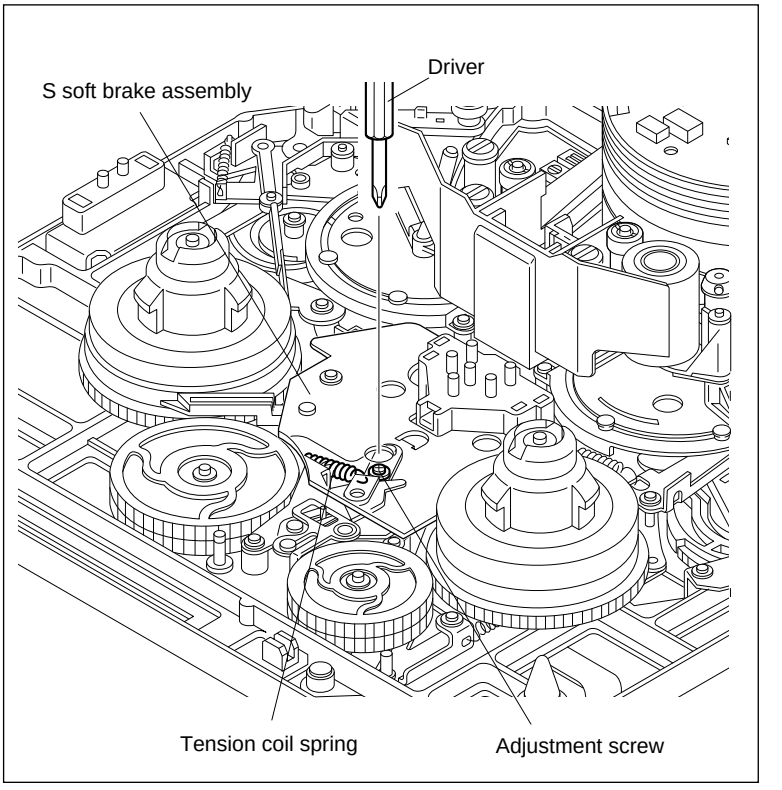
### Adjustment

#### 1. Timing belt (reel) tension adjustment

**Note**

The belt tension is necessarily determined by the force of the tension coil spring as shown in the figure.

(1) Insert the driver into the hole as shown in the figure of the S soft brake assembly.
(2) Loosen the adjustment screw shown in the figure by one or two turns.
(3) Tighten the adjustment screw loosened in step (2).
   [Tightening torque:
   $9 \times 10^{-2}$ N•m (0.9 kgf•cm)]

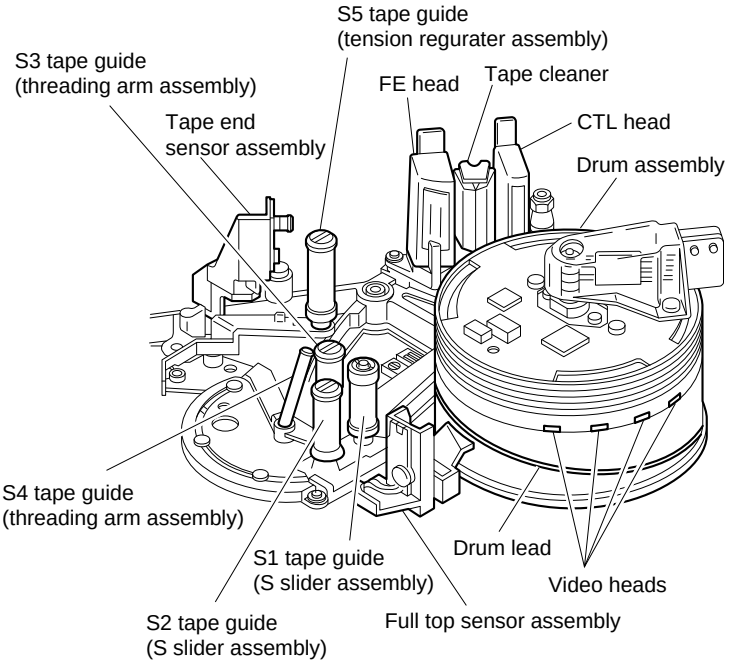


# 4-2. Tape Running System Adjustment

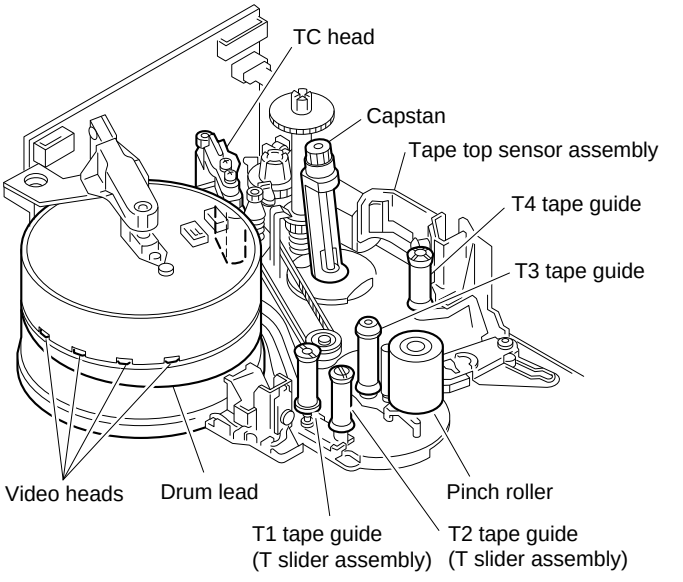
## Index

## 1. Location of parts in tape running system

**Drum entrance side (unthreading end state)**




**Drum exit side (unthreading end state)**



## 2. Precaution

Cassette compartment

- Perform the tape running adjustment with the cassette compartment installed.
- The DNV-5 has a selection switch for NTSC or PAL mode. (If the adjustment is complete in the one mode, no adjustment is required in the other mode.) Before beginning the tape running system adjustment, be sure to check the setting of this switch.

## 3. Preparation

(1) Turn off the POWER switch of the unit.
(2) Remove the front lid and outside panel.
(Refer to section 1-6 in Part 1 of the Maintenance Manual.)
(3) Clean the following with cleaning cloth moistened with cleaning fluid.
(DNV-5: Refer to sections 5-1-2 to 5-1-5 in Part 1 of the Maintenance Manual.)
(DNW-7/7P/90/90P/90WS/90WSP: Refer to sections 6-1-2 to 6-1-5 in Part 1 of the Maintenance Manual.)

- Video heads
- Upper drum tape running path
- Lower drum tape running path and lead surface
- Fixed heads
- Tape cleaner
- Tape guides
- Capstan shaft
- Pinch roller

## 4. Tools

| | |
|---|---|
| • Tape guide adjustment screwdriver (45) | J-6322-420-A |
| • Screwdriver bit (45)(Width across flat has 0.89 mm) | J-6322-420-3 |
| • TP tool | A-8312-292-A |
| • Compact mirror | J-6080-840-A |
| • Cleaning cloth | 3-184-527-01 |
| • Cleaning fluid | 9-919-573-01 |
| • Cassette tape (BCT-60SX) | Standard products |
| • Oscilloscope | |
| • Locking compound (1401B) | 7-432-114-11 |
| • Skewer | |
| • Alignment tape SR2-1 | 8-960-075-11(for NTSC) |
| Alignment tape SR2-1P | 8-960-075-61(for PAL) |

| TIME mim. sec. | CTL TRACK | AUX TRACK | VIDEO/AUDIO TRACK | For use *1 |
|---|---|---|---|---|
| 00 : 00 | CTL | 3 kHz, 0 VU (PAL : 3.15 kHz, 0 VU) | 3.212 MHz *2 (A CH only) | • Video tracking adjustment<br>• CTL head position adjustment<br>• TC head height adjustment<br>• TC head position adjustment |
| (CTL PULSE) | | | | |
| 15 : 00 | CTL | 3 kHz, 0 VU (PAL : 3.15 kHz, 0 VU) | A CH : 3.212 MHz *2<br>B CH : 6.424 MHz *2 | |
| 20 : 00 | CTL | 3 kHz, 0 VU (PAL : 3.15 kHz, 0 VU) | 12.848 MHz *2 (ALL CHANNEL) | |
| 25 : 00 | CTL | ——— | 100% color bars (ALL CHANNEL) | |
| 27 : 00 | | | | |

Contents of recording

*1 : The height of the CTL head can be adjusted in any portion.
*2 : When playing back this portion with DNV-5 or DNW-7/7P/90/90P/90WS/90WSP, the output signal from the unit will become a third in frequeucy.

## 4-2-1. Tape Running Adjustment

Perform this adjustment only when replacing the S1/T1/T3 tape guides, other tape guide assembly (S2 to S5, T2) or the parts of the tape running system such as stationary heads.

### Precaution

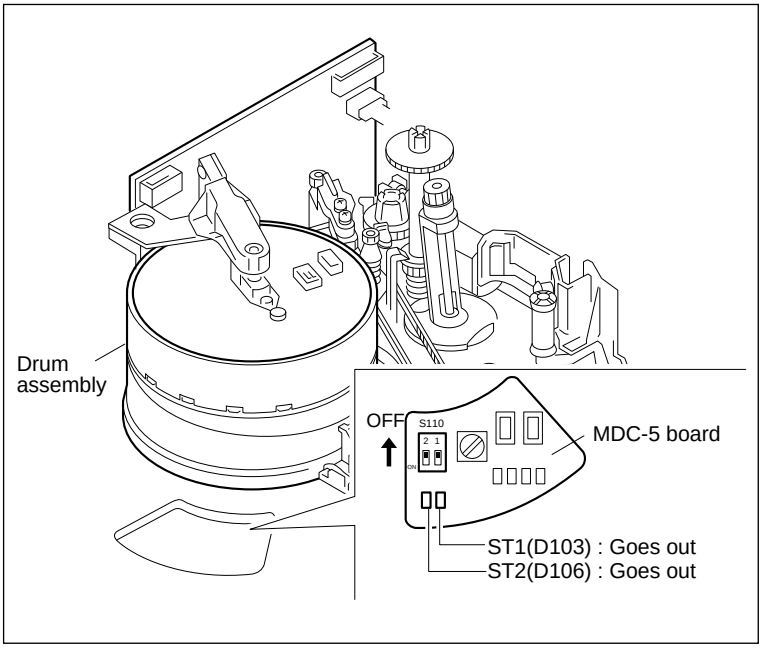
- When the tape running adjustment is performed after some part in the tape running system is replaced, confirm and adjust the tape running by a standard cassette tape (BCT-60SX or BCT-30MA).
  If no CTL signal is recorded in the cassette tape, however, the confirmation may become difficult due to oscillation of tension regulator in the PLAY state. So, it recommended to use CTL -signal- recorded tape.
  After that, confirm and fine-adjust the tape running by alignment tape SR2-1/1P.
- Except the item in which the cassette tape to be used must be limited, the confirmation and adjustment below are described with the alignment tape used.
- Tighten the setscrew at the top of the tape guide at the tightening torque below.
  $9 \times 10^{-2}$ N•m (0.9 kgf•cm)
- After adjustment, confirm the video tracking adjustment. After that, apply locking compound to the setscrew at the top of each tape guide.

### Tools

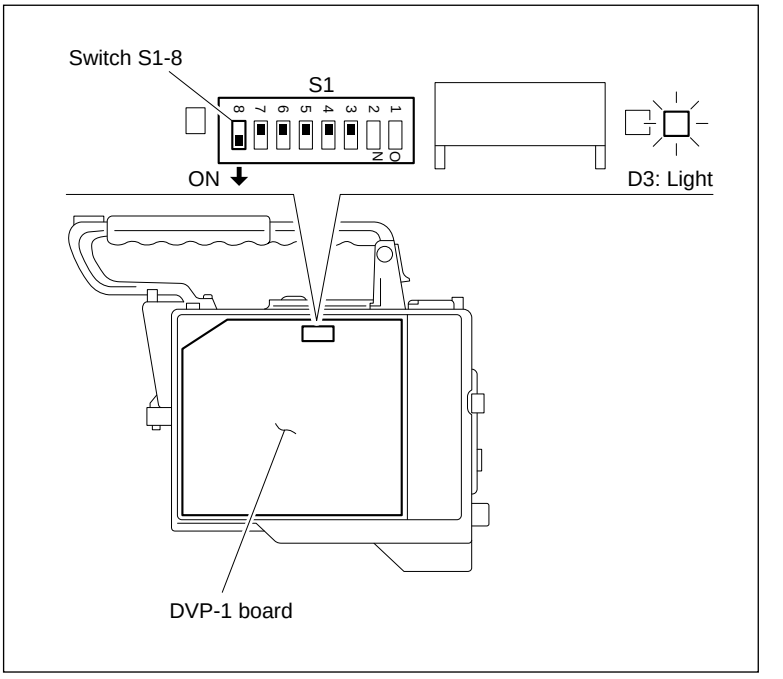
| | |
|---|---|
| • Tape guide adjustment screwdriver (45) | J-6322-420-A |
| • Screwdriver bit (45)(across 0.89 mm) | J-6322-420-3 |
| • Compact mirror | J-6080-840-A |
| • Alignment tape SR2-1 | 8-960-075-11(for NTSC) |
| Alignment tape SR2-1P | 8-960-075-61(for PAL) |
| • Cassette tape BCT-60SX(or BCT-30MA) | Standard products |
| • Locking compound (1401B) | 7-432-114-11 |

## Preparations

1. Turn off the power.
2. Remove the front lid, inside panel, and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
3. Set switches S110-1 and S110-2 on the MDC-5 board to OFF.




4. Set switch S1-8 on the DVP-1 board to ON.
5. Turn on the power.



**Drum entrance side**

## Confirmations

### 1. PLAY state (Tape top portion)

Put the tape top portion (01:00 to 10:00) of the cassette tape BCT-60SX into the PLAY state.
At that time, confirm that the tape runs according to specifications 1.
If specifications 1 are not satisfied, perform steps 7 and later.

### 2. F FWD state (Tape top portion)

Put the tape top portion (01:00 to 10:00) of the cassette tape BCT-60SX into the F FWD state.
At that time, confirm that the tape runs according to specifications 1.
If specifications 1 are not satisfied, perform steps 7 and later.

### 3. REW state (Tape top portion)

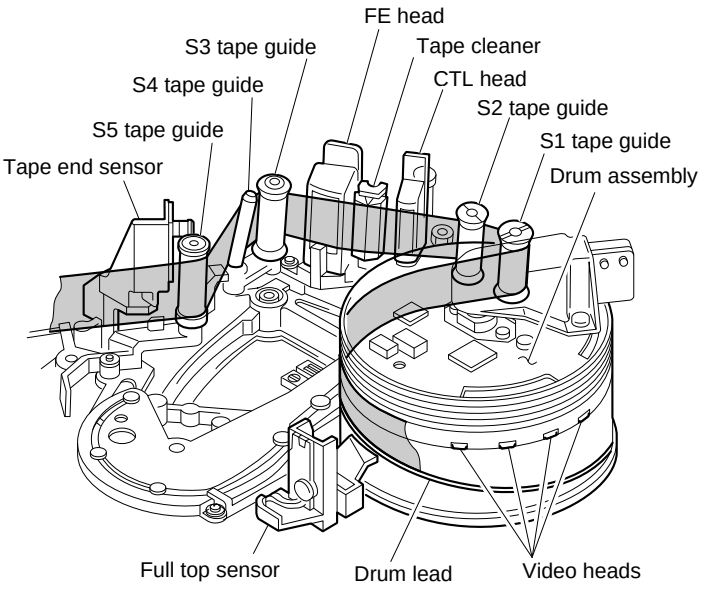
Put the tape top portion (01:00 to 10:00) of the cassette tape BCT-60SX into the REW state.
At that time, confirm that the tape runs according to specifications 1.
If specifications 1 are not satisfied, perform steps 7 and later.

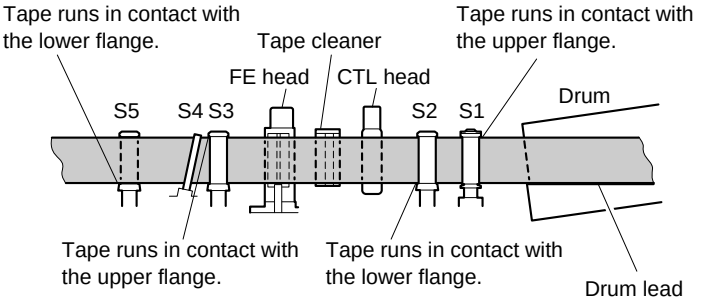
### 4. PLAY state (Tape end portion)

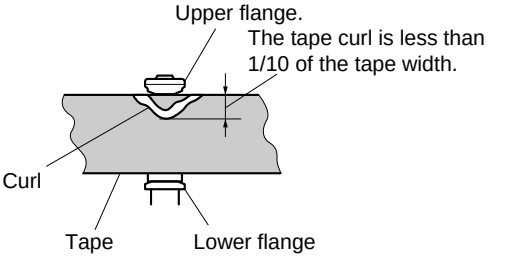
Put the tape end portion (50:00 to 60:00) of the cassette tape BCT-60SX into the PLAY state.
At that time, confirm that the tape runs according to specifications 1.
If specifications 1 are not satisfied, perform steps 7 and later.

### 5. F FWD state (Tape end state)

Put the tape end portion (50:00 to 60:00) of the cassette tape BCT-60SX into the F FWD state.
At that time, confirm that the tape runs according to specifications 1.
If specifications 1 are not satisfied, perform steps 7 and later.




Specifications 1:

(A) S3 tape guide
Tape runs in contact with the upper flange.
(In the FF or REV state, the tape runs in contact with the upper or lower flange.)
The allowable tape curl is 1/10 or below of the tape width.

(B) S2 tape guide
Tape runs in contact with the lower flange.
No tape curl should be allowed. (In the REV state, 1/10 or below of tape width is allowed.)

(C) S1 tape guide
Tape runs in contact with the upper flange.
The allowable tape curl is 1/10 or below of the tape width.

(D) Drum lead
Tape runs in contact with the drum lead surface.
No tape curl should be allowed.

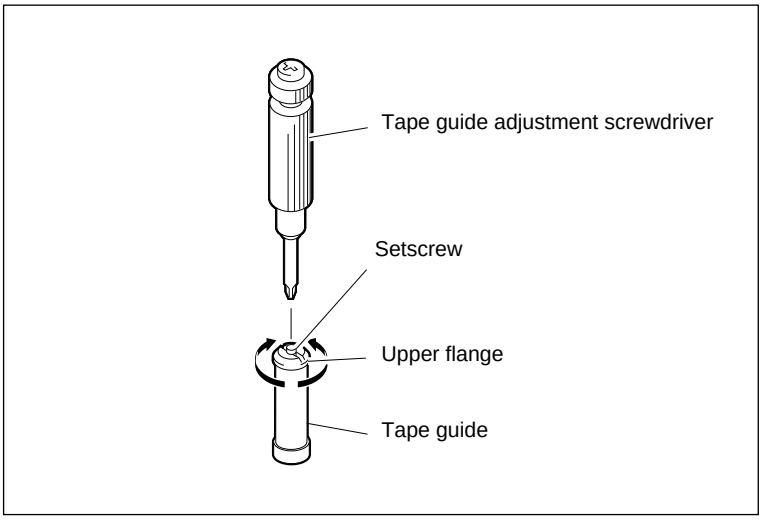
### 6. REW state (Tape end portion)

Put the tape end portion (50:00 to 60:00) of the cassette tape BCT-60SX into the REW state.
At that time, confirm that the tape runs according to specifications 1.
If specifications 1 are not satisfied, perform steps 7 and later.

## Adjustment

### 7. S1 tape guide height adjustment

(1) Put the cassette tape into the PLAY state.
(2) Loosen the setscrew at the top of the guide using a tape guide adjustment screwdriver. Turn the upper flange and adjust the height so that specifications 1 are satisfied.
(3) Tighten the setscrew at the top of the guide.




### 8. Tape running reconfirmation on drum entrance side

Perform steps 1 to 6 in confirmation and reconfirm that the specifications are satisfied.
If not, perform the adjustment in step 7 again.

### 9. Tape running confirmation on drum exit side

Confirm the tape running on the drum exit side on the next and later pages.

## When adjustment is performed

### 10. Video tracking confirmation

(Refer to section 4-2-2.)

### 11. CTL head height confirmation

(Refer to section 4-2-3.)

### 12. CTL head position confirmation

(Refer to section 4-2-4.)

### 13. TC head position confirmation

(Refer to section 4-2-6.)

### Drum exit side

### Confirmation

**1. PLAY state (Tape top portion)**
Put the tape top portion (01:00 to 10:00) of the cassette tape BCT-60SX into the PLAY state.
At that time, confirm that the tape runs according to specifications 2.
If specifications 2 are not satisfied, perform steps 8 and later.

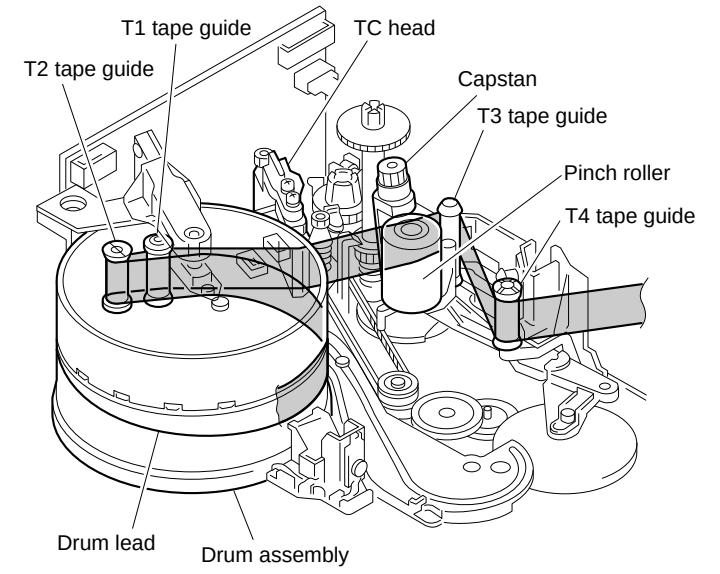
**2. F FWD state (Tape top portion)**
Put the tape top portion (01:00 to 10:00) of the cassette tape BCT-60SX into the F FWD state.
At that time, confirm that the tape runs according to specifications 2.
If specifications 2 are not satisfied, perform steps 8 and later.

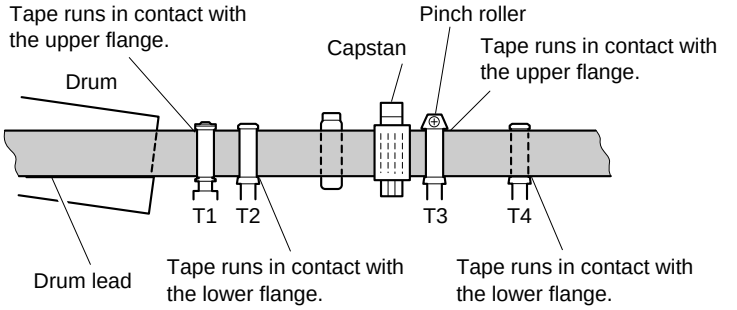
**3. REW state (Tape top portion)**
Put the tape top portion (01:00 to 10:00) of the cassette tape BCT-60SX into the REW state.
At that time, confirm that the tape runs according to specifications 2.
If specifications 2 are not satisfied, perform steps 8 and later.

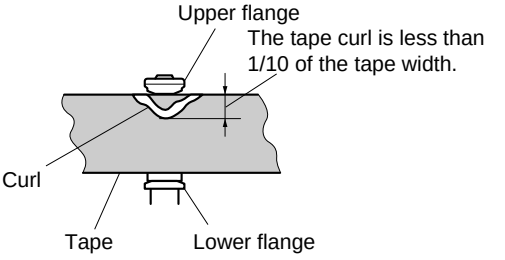
**4. PLAY state (Tape end portion)**
Put the tape end portion (50:00 to 60:00) of the cassette tape BCT-60SX into the PLAY state.
At that time, confirm that the tape runs according to specifications 2.
If specifications 2 are not satisfied, perform steps 8 and later.

**5. F FWD state (Tape end portion)**
Put the tape end portion (50:00 to 60:00) of the cassette tape BCT-60SX into the F FWD state.
At that time, confirm that the tape runs according to specifications 2.
If specifications 2 are not satisfied, perform steps 8 and later.

**6. REW state (Tape end portion)**
Put the tape end portion (50:00 to 60:00) of the cassette tape BCT-60SX into the REW state.
At that time, confirm that the tape runs according to specifications 2.
If specifications 2 are not satisfied, perform steps 8 and later.




Specifications 2:
(A) T4 tape guide
Tape runs in contact with the lower flange.
(In the FF or REW state, the tape runs in contact with the upper or lower flange.)
The allowable tape curl is 1/10 or below of the tape width.
(B) T3 tape guide
Tape runs in contact with the upper flange.
(In the FF or REW state, the tape runs in contact with the upper or lower flange.)
The allowable tape curl is 1/10 or below of the tape width.
(C) T2 tape guide
Tape runs in contact with the lower flange.
No tape curl should be allowed. (In the REW state, 1/10 or below of tape width is allowed.)
(D) T1 tape guide
Tape runs in contact with the upper flange.
The allowable tape curl is 1/10 or below of the tape width.
(E) Drum lead
Tape runs in contact with the drum lead surface.
No tape curl should be allowed.

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### 7. Tape running confirmation near capstan shaft

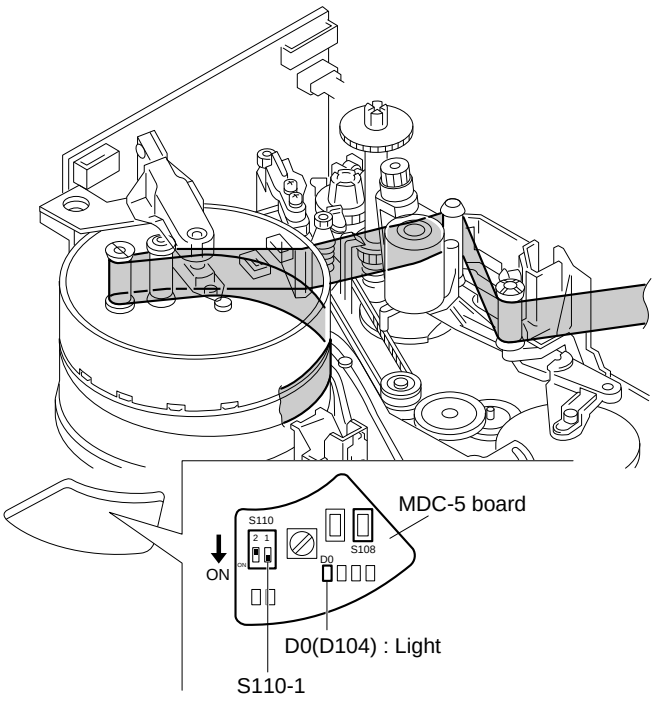
(1) Put the tape end portion (50:00 to 60:00) of the cassette tape BCT-60SX into the REW state, then put it into the PLAY state after a few seconds.
During mode selection, confirm that the tape runs according to specifications 3 between the TC head and capstan shaft, and between the T3 tape guide and capstan shaft.
Repeat this operation two or three times and confirm specifications 3.
- If specifications 3 are not satisfied between the TC head and capstan shaft, perform the T1 tape guide height adjustment in step 8 and the subsequent steps.
- If specifications 3 are not satisfied between the T3 tape guide and capstan shaft, perform the T3 tape guide height adjustment in step 8.

(2) Also when the following operations are repeated two or three times, confirm that specifications 3 are satisfied in the same matter as above.
- When the unit is put into the F FWD state, then put into the PLAY state after a few seconds
- When the unit is put into the REV ×1 state, then put into the PLAY state after a few seconds

When specifications 3 are not satisfied;
- If specifications 3 are not satisfied between the TC head and capstan shaft, perform the T1 tape guide height adjustment in step 8 and the subsequent steps.
- If specifications 3 are not satisfied between the T3 tape guide and capstan shaft, perform the T3 tape guide height adjustment in step 8.

#### Entering the REV ×1 state

(1) Set switch S110-1 on the MDC-5 board to ON.
(2) Press switch S108 on the MDC-5 board to light D0.
(3) Press REW button.

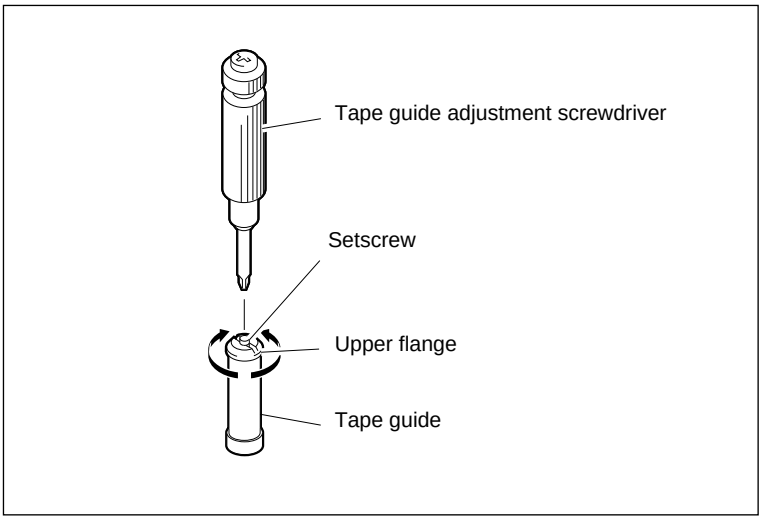



Specifications 3:
No tape wrinkle should occur on the tape.
Any tape curl should disappear within one second even if it occurs.
The curl should not damage the tape.

## Adjustment

### 8. Tape guide height adjustment

(1) Put the cassette tape BCT-60SX into the PLAY state.
(2) Loosen the setscrew at the top of the guide using a tape guide adjustment screwdriver. Turn the upper flange and adjust the height so that specifications 2 and 3 are satisfied.
(3) Tighten the setscrew at the top of the guide at the tightening torque below.
[Tightening torque:
$9 \times 10^{-2}$ N•m (0.9 kgf•cm)]




**Note**

- The T4 tape guide cannot be aligned because it is fixed. Do not turn forcedly the upper flange.
- The T2 tape guide has no setscrew for adjustment. Turn the upper flange to adjust.

### 9. Tape running reconfirmation on drum exit side

Perform steps 1 to 7 in confirmation and reconfirm that the specifications are satisfied.
If the specifications are not satisfied, perform the adjustment in step 8 again.

### 10. Tape running reconfirmation on drum entrance side

Reconfirm the tape running on the drum entrance side described previously.

### 11. Switch setting after adjustment

| | |
|---|---|
| MDC-5 board | S110-1 : OFF |
| | S110-2 : OFF |
| DVP-1 board | S1-8 : OFF |

## When adjustment is performed

### 12. Video tracking confirmation

(Refer to section 4-2-2.)

### 13. TC head height confirmation

(Refer to section 4-2-5.)

### 14. CTL head position confirmation

(Refer to section 4-2-4.)

### 15. TC head position confirmation

(Refer to section 4-2-6.)

## 4-2-2. Video Tracking Adjustment

### Precautions

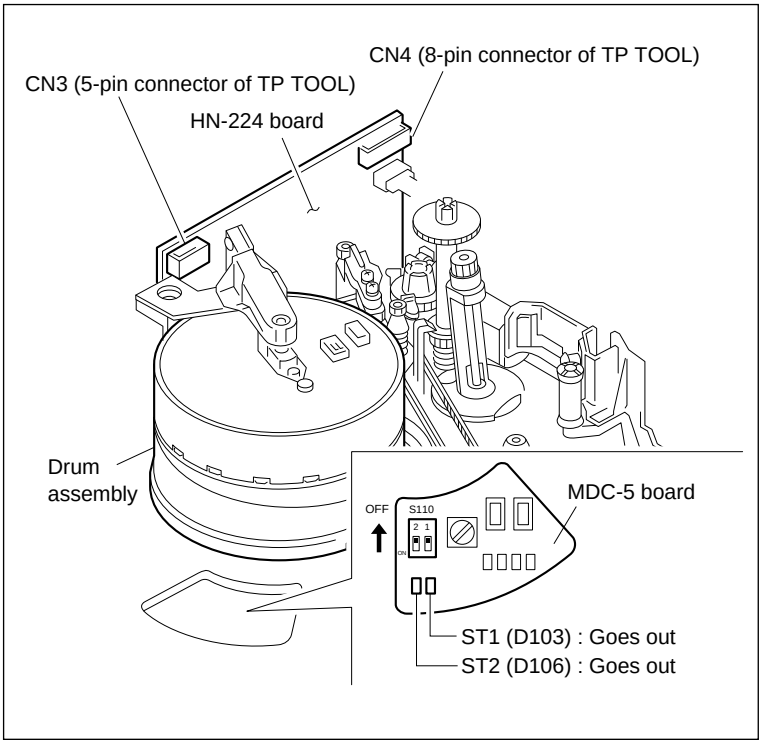
- Tighten the setscrew at the top of the tape guide at the tightening torque below.
  $9 \times 10^{-2}$ N•m (0.9 kgf•cm)
- After the video tracking adjustment, confirm the tape running. After that, apply locking compound to the setscrew at the top of each tape guide.

### Tools

| | |
|---|---|
| • Tape guide adjustment screwdriver (45) | J-6322-420-A |
| • Screwdriver bit (45)(across 0.89 mm) | J-6322-420-3 |
| • TP tool | A-8312-292-A |
| • Compact mirror | J-6080-840-A |
| • Alignment tape SR2-1 | 8-960-075-11(for NTSC) |
| Alignment tape SR2-1P | 8-960-075-61(for PAL) |

### Preparations

1. Turn off the power.
2. Remove the front lid and outside panel. (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
3. Connect a TP tool to the HN-224 board as described below.
   5-pin connector of TP tool: CN3 on HN-224 board
   8-pin connector of TP tool: CN4 on HN-224 board
4. Confirm that switches S110-1 and S110-2 are all OFF, and ST1 and ST2 stay unit.
5. Connect an oscilloscope.
   CH-1: REC A PB on TP tool board
   TRIG: SERVO CF on TP tool board
6. Turn on the power.
7. Insert the alignment tape SR2-1/1P.



## Confirmations

### 1. Video tracking confirmation

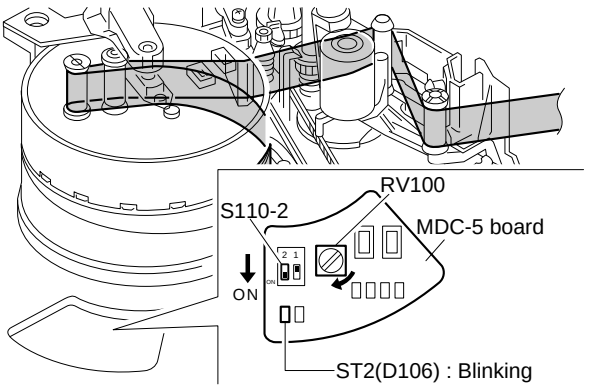
(1) Set switch S110-2 on the MDC-5 board to ON. ST2 (D106) then blinks. This enables the tracking control operation.
(2) Play back the tape top portion (00:00 to 15:00) of the alignment tape SR2-1/1P.
(3) Confirm that the levels on the entrance and exit sides do not exceed the output level in the center when the tracking control (RV100) on the MDC-5 board is turned.
If the output level on the entrance or exit sides exceeds the output level in the center, perform the adjustment (on the drum entrance or exit side) in steps 5 and later.
(4) Turn the tracking control so that the RF signal waveform is 80% of the maximum output level. At that time, confirm that the RF signal waveform satisfies specifications 1 to 3. If these specifications are not satisfied, perform the adjustment (on the drum entrance or exit side) in steps 3 and later.

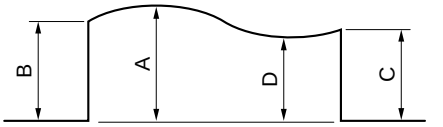
### 2. Video tracking confirmation in various modes

(1) Put the unit in a horizontal position and then in a vertical position. At that time, confirm that the RF signal waveform satisfies specifications 1 to 3.
If these specifications are not satisfied, perform the adjustment (on the drum entrance or exit side) in steps 3 and later.
(2) Put the unit in a horizontal position again and repeat the mode selection of EJECT to PLAY two or three times. At that time, confirm that the RF signal waveform in the PLAY mode is the same as the former waveform without change and that specifications 1 to 3 are satisfied. If the RF signal waveform is changed or if these specifications are not satisfied, perform the adjustment (on the drum entrance or exit side) in steps 3 and later.
(3) Also when the following operations are repeated two or three times, confirm that the RF signal waveform in the PLAY mode is the same as the former waveform without change and that specifications 1 to 3 are satisfied.
- When the unit is put from the REV ×5 state to the PLAY state
- When the unit is put from the STOP state to the PLAY state
If the RF signal waveform is changed or if specifications 1 to 3 are not satisfied, perform the adjustment (on the drum entrance or exit side) in steps 3 and later.

#### Entering the REV ×5 Mode

Press the PLAY button, then the REW button. (Both the PLAY and REW buttons on the keyboard light.)

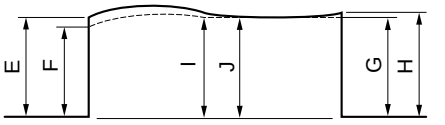



Specifications 1 : The output of the whole waveform should be more than 85% of the maximum value.

$$\frac{B}{A} \geqq 0.85 \quad , \quad \frac{C}{A} \geqq 0.85 \quad , \quad \frac{D}{A} \geqq 0.85$$

B, C, and D are the output value of the waveform's rising and falling edges and minimum value portion, respectively.




Specifications 2 : The fluctuation value in each portion of a waveform should be less than 10%.

$$\frac{F}{E} \geqq 0.9 \quad , \quad \frac{G}{H} \geqq 0.9 \quad , \quad \frac{I}{J} \geqq 0.9$$

F and E, G and H, and I and J are the upper and lower values of the waveform's rising and falling edges and the fluctuation in the waveform center, respectively.

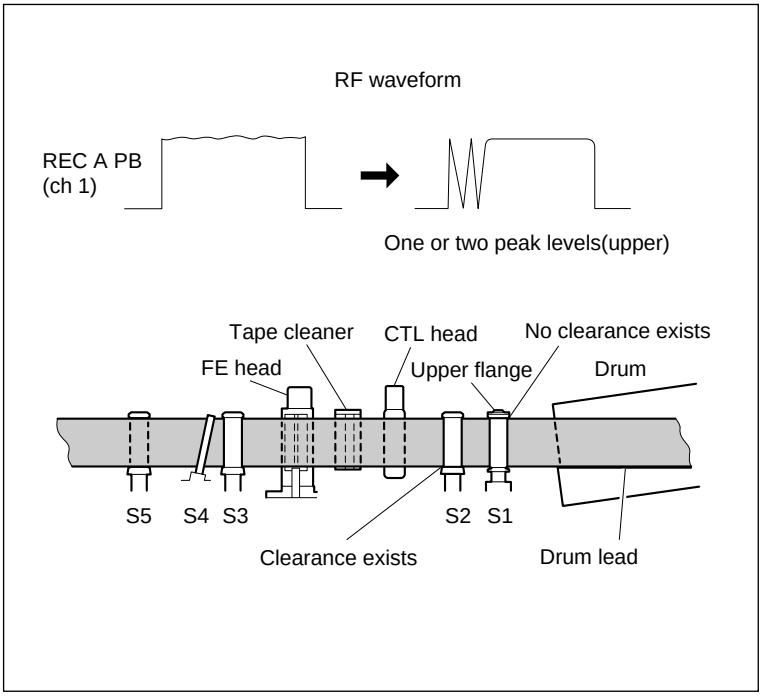
Specifications 3 : Tape runs in contact with the upper flange of S1 and T1 tape guides.
The allowable tape curl is 1/10 or below of the tape width.

## Adjustment

### Drum entrance side

#### 3. Tracking adjustment on drum entrance side

(1) Set switch S110-2 on the MDC-5 board to OFF.
(2) Play back the tape top portion (01:00 to 15:00) of the alignment tape SR2-1/1P.
(3) Loosen the setscrew at the top of the S1 guide using a tape guide adjustment screwdriver.
(4) Turn the upper flange of the S1 guide counterclockwise using a tape guide adjustment screwdriver so that one or two peak levels are generated in an RF signal waveform as shown in the figure. At that time, confirm the following.
  - Confirm that no clearance exists between the upper flange of the S1 guide and the upper edge of the tape.
  - Confirm that a clearance exists between the lower flange of the S2 guide and the lower edge of the tape.
(5) Turn the upper flange of the S1 guide clockwise so that the RF signal waveform is almost flat.
(6) Set switch S110-2 on the MDC-5 board to ON.
  ST2 (D106) then blinks. This enables the tracking control operation.
(7) Play back the tape top portion (01:00 to 15:00) of the alignment tape SR2-1/1P.
(8) Turn the tracking control (RV100) so that the center of the RF signal waveform is 80% of the maximum output level.
(9) Turn the upper flange of the S1 guide and fine-adjust the height of the S1 guide so that specifications 1 to 3 are satisfied.
(10) Tighten the setscrew at the top of the S1 guide at the tightening torque below.
  [Tightening torque:
  $9 \times 10^{-2}$ N•m (0.9 kgf•cm)]



### 4. Video tracking reconfirmation

Perform steps 1 and 2 in confirmation and reconfirm the video tracking.

### 5. Tape running confirmation

Confirm the tape running state (on the drum entrance side) according to section 4-2-1.

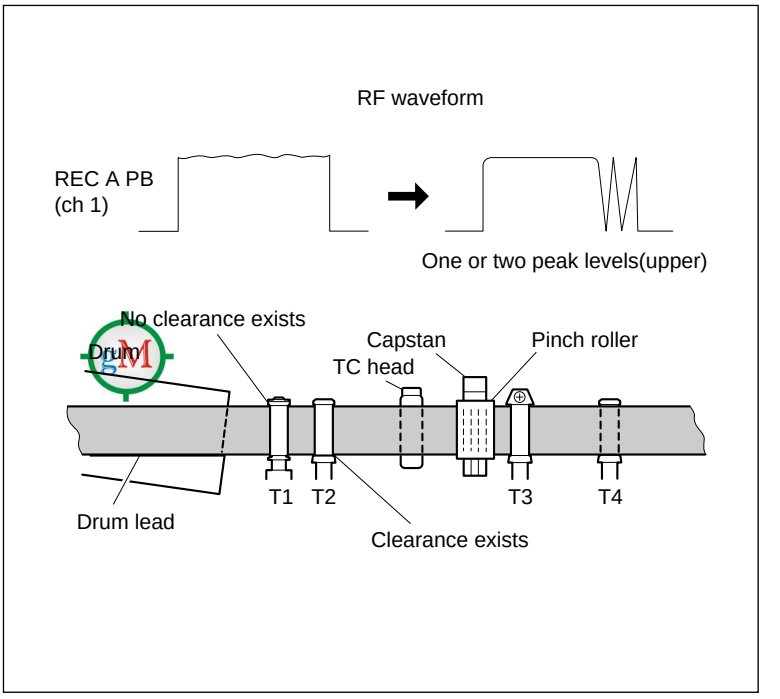
**Note**

After adjustment is completed, set switch S110-2 on the MDC-5 board to OFF.

### Drum exit side

### 6. Tracking adjustment on drum exit side

(1) Set switch S110-2 on the MDC-5 board to OFF.
(2) Play back the tape top portion (01:00 to 15:00) of the alignment tape SR2-1/1P.
(3) Loosen the setscrew at the top of the T1 guide using a tape guide adjustment screwdriver.
(4) Turn the upper flange of the T1 guide counterclockwise using a tape guide adjustment screwdriver so that one or two peak levels are generated in the RF signal waveform as shown in the figure. At that time, confirm the following.
  - Confirm that no clearance exists between the upper flange of the T1 guide and the upper edge of the tape.
  - Confirm that a clearance exists between the lower flange of the T2 guide and the lower edge of the tape.
(5) Turn the upper flange of the T1 guide clockwise so that the RF signal waveform is almost flat.
(6) Set switch S110-2 on the MDC-5 board to ON.
  ST2 (D106) then blinks. This enables the tracking control operation.
(7) Play back the tape top portion (01:00 to 15:00) of the alignment tape SR2-1/1P.
(8) Turn the tracking control (RV100) so that the center of the RF signal waveform is 80 % of the maximum output level.
(9) Turn the upper flange of the T1 guide and fine-adjust the height of the T1 guide so that specifications 1 to 3 are satisfied.
(10) Tighten the setscrew at the top of the T1 guide at the tightening torque below.
  [Tightening torque:
  $9 \times 10^{-2}$ N•m (0.9 kgf•cm)]



**7. Video tracking reconfirmation**

Perform steps 1 and 2 in confirmation and reconfirm the video tracking.

**8. Tape running confirmation**

Confirm the tape running state (on the drum exit side) according to section 4-2-1.

**Note**

After adjustment is completed, set switch S110-2 on the MDC-5 board to OFF.

---

**When adjustment is performed**

**9. CTL head height confirmation**

(Refer to section 4-2-3.)

**10. CTL head position confirmation**

(Refer to section 4-2-4.)

**11. TC head position confirmation**

(Refer to section 4-2-6.)

**12. TC head height confirmation**

(Refer to section 4-2-5.)

## 4-2-3. CTL Head Height Adjustment

### Tools

| | |
|---|---|
| • TP tool | A-8312-292-A |
| • Alignment tape SR2-1 | 8-960-075-11(for NTSC) |
| Alignment tape SR2-1P | 8-960-075-61(for PAL) |
| • Box screwdriver (across 4.5 mm) | 7-700-751-01 |
| • Oscilloscope | |
| • Skewer | |

### Preparations

1. Turn off the power.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
3. Connect a TP tool to the HN-224 board as described below.
   5-pin connector of TP tool: CN3 on HN-224 board
   8-pin connector of TP tool: CN4 on HN-224 board
4. Set switches S110-1 and S110-2 on the MDC-5 board to OFF.
5. Connect an oscilloscope.
   CH-1: PB CTL on TP tool board
   TRIG: SERVO CF on TP tool board
6. Turn on the power.
7. Insert alignment tape SR2-1/1P.

## Confirmations

### 1. Alignment tape playback

Play back the tape top portion (01:00 to 15:00) of the alignment tape SR2-1/1P.

### 2. CTL head height confirmation

(1) Press down portion A on the tape shown in the figure by a skewer. At that time, confirm that the level decreases.
If the level increases, perform step 3.

(2) Press up portion B on the tape shown in the figure by a skewer. At that time, confirm that the level decreases.
If the level increases, perform step 3.

## Adjustment

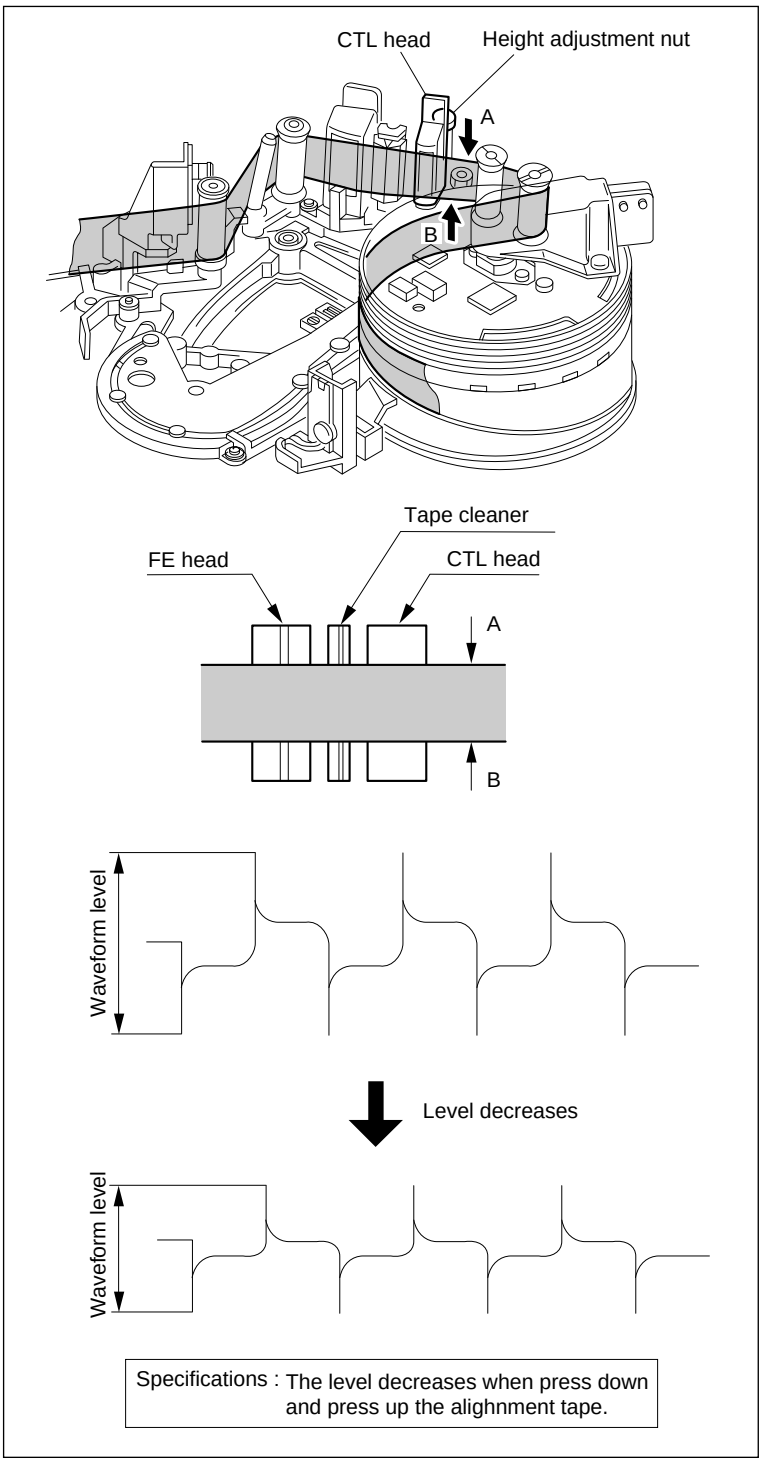
### 3. CTL head height adjustment

If the level increases when the tape is pressed down;
Turn the height adjustment nut counterclockwise and adjust so that the output waveform is maximum.

If the level increases when the tape is pushed up;
Turn the height adjustment nut clockwise and adjust so that the output waveform is maximum.

### 4. CTL head height reconfirmation

Reconfirm the CTL head height according to steps 1 and 2.




## When adjustment is performed

### 5. CTL head position adjustment

(Refer to section 4-2-4.)

### 6. TC head position adjustment

(Refer to section 4-2-6.)

## 4-2-4. CTL Head Position Adjustment

### Precaution

The CTL head position adjustment is closely related with the TC head position adjustment.
Confirm the TC head position when the CTL head position adjustment is performed.

### Tools

| | |
|---|---|
| • TP tool | A-8312-292-A |
| • Alignment tape SR2-1 | 8-960-075-11(for NTSC) |
| Alignment tape SR2-1P | 8-960-075-61(for PAL) |
| • Box screwdriver (across 4.5 mm) | 7-700-751-01 |
| • Oscilloscope | |

### Preparations

1. Turn off the power.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
3. Connect a TP tool to the HN-224 board as described below.
   5-pin connector of TP tool: CN3 on HN-224 board
   8-pin connector of TP tool: CN4 on HN-224 board
4. Connect an oscilloscope.
   CH-1: REC A PB on TP tool board
   CH-2(TRIG): SERVO CF on TP tool board
5. Turn on the power.
6. Insert alignment tape SR2-1/1P.

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## Confirmations

### 1. Alignment tape playback

Play back the tape top portion (01:00 to 15:00) of the alignment tape SR2-1/1P.

### 2. CTL head position confirmation

(1) Set switch S110-2 on the MDC-5 board to ON.
ST2 (D106) then blinks. This enables the tracking control operation.

(2) Turn the tracking control (RV100) on the MDC-5 board so that the output level in the center of an envelope waveform is maximum. At that time, confirm that the marker portion of the envelope waveform is in proper alignment with SERVO CF (TRIG).

(3) Set switch S110-2 on the MDC-5 board to OFF and put the tracking control into the FIX state.
At that time, confirm that the output level of the envelope waveform is the same as the level in step (2) without change.
If the specifications are not satisfied, perform steps 3 and later.

## Adjustment

### 3. CTL head position adjustment

Turn the position adjustment nut of the CTL head using a box screwdriver. At that time, adjust so that the marker position of the envelope waveform satisfies the specification and so that the output level in the center of an envelope waveform is maximum.

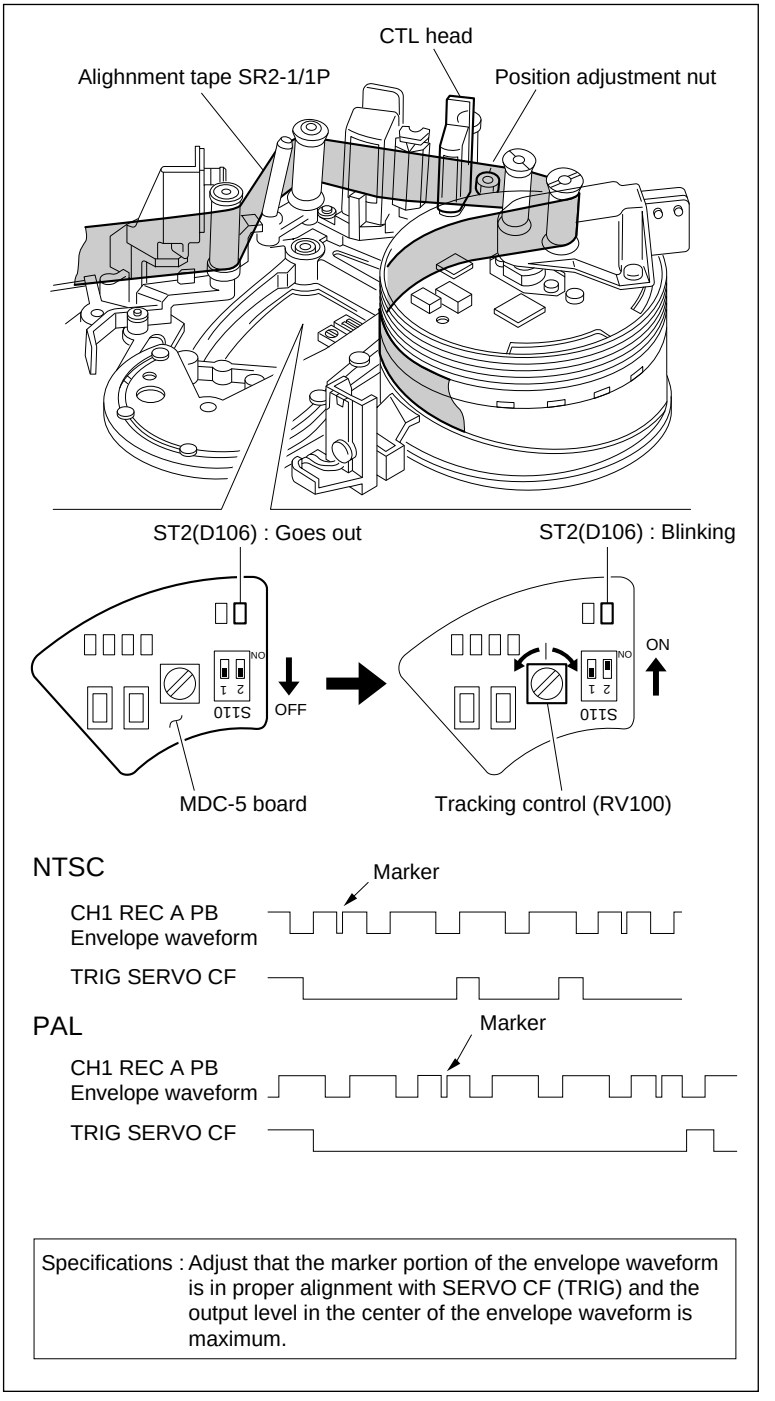
### 4. CTL head position reconfirmation

Reconfirm the CTL head position according to steps 1 and 2.

## When adjustment is performed

### 5. TC head position adjustment

(Refer to section 4-2-5.)




Specifications : Adjust that the marker portion of the envelope waveform is in proper alignment with SERVO CF (TRIG) and the output level in the center of the envelope waveform is maximum.

## 4-2-5. TC Head Height Adjustment

### Precaution

The TC head height adjustment is closely related with the TC head position adjustment.
Confirm the TC head position when the TC head height adjustment is performed.
This adjustment is performed based on the AUX track recorded on the alignment tape. By adjusting the AUX head position, the TC head height is necessarily determined.

### Tools

| | |
|---|---|
| • TP tool | A-8312-292-A |
| • Alignment tape SR2-1 | 8-960-075-11(for NTSC) |
| Alignment tape SR2-1P | 8-960-075-61(for PAL) |
| • Box screwdriver (across 4.5 mm) | 7-700-751-01 |
| • Oscilloscope | |

### Preparations

1. Turn off the power.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
3. Connect a TP tool to the HN-224 board as described below.
   5-pin connector of TP tool: CN3 on HN-224 board
   8-pin connector of TP tool: CN4 on HN-224 board
4. Set switches S110-1 and S110-2 on the MDC-5 board to OFF.
5. Connect an oscilloscope.
   CH-2: PB AUX on TP tool board
6. Turn on the power.
7. Insert alignment tape SR2-1/1P.

## Confirmations

### 1. Alignment tape playback

Play back the tape top portion (01:00 to 15:00) of the alignment tape SR2-1/1P.

### 2. TC head height confirmation

(1) Press down portion A on the tape shown in the figure by a skewer. At that time, confirm that the level decreases.
If the level increases, perform step 3.

(2) Press up portion B on the tape shown in the figure by a skewer. At that time, confirm that the level decreases.
If the level increases, perform step 3.

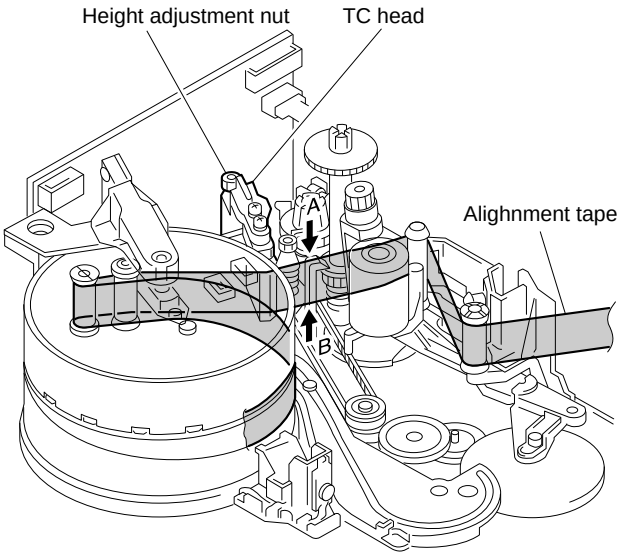
(3) Repeat the mode selection of EJECT to PLAY two or three times. At that time, confirm that the output level is the same as the former level without change.
If the level changes, perform step 3.

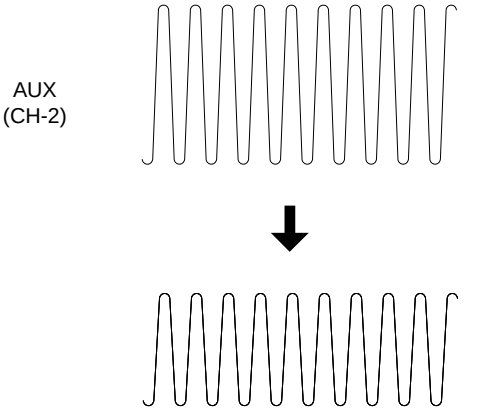
## Adjustment

### 3. TC head height adjustment

If the level increases when the tape is pressed down;
Turn the height adjustment nut counterclockwise and adjust so that the output waveform is maximum.

If the level increases when the tape is pushed up;
Turn the height adjustment nut clockwise and adjust so that the output waveform is maximum.




Specifications : The level decreases when pressing down and pushing up the alignment tape.

## When adjustment is performed

### 4. TC head position adjustment

(Refer to section 4-2-6.)

### 5. TC head height reconfirmation

Reconfirm the CTL head height according to steps 1 and 2.

## 4-2-6. TC Head Position Adjustment

### Precaution

The TC head position adjustment is performed with the CTL head position as reference. Therefore, the CTL head position adjustment must have been completed before performing the TC head position adjustment.
Confirm the TC head height when the TC head position adjustment is performed.

### Tools

| | |
|---|---|
| • TP tool | A-8312-292-A |
| • Alignment tape SR2-1 | 8-960-075-11(for NTSC) |
| Alignment tape SR2-1P | 8-960-075-61(for PAL) |
| • Box screwdriver (across 4.5 mm) | 7-700-751-01 |
| • Oscilloscope | |

### Preparations

1. Turn off the power.
2. Remove the front lid and outside panel.
   (Refer to section 1-6 in Part 1 of the Maintenance Manual.)
3. Connect a TP tool to the HN-224 board as described below.
   5-pin connector of TP tool: CN3 on HN-224 board
   8-pin connector of TP tool: CN4 on HN-224 board
4. Set switches S110-1 and S110-2 on the MDC-5 board to OFF.
5. Connect an oscilloscope.
   CH-1: SHAPED CTL on TP tool board
   CH-2: PB TC on TP tool board
   TRIG: SERVO CF on TP tool board
6. Turn on the power.
7. Insert alignment tape SR2-1/1P.

## Confirmation

### 1. Alignment tape playback

Play back the tape top portion (01:00 to 15:00) of the alignment tape SR2-1/1P.

### 2. TC head position confirmation

(1) Confirm that the phase difference at the falling and rising edges of a CTL pulse satisfies the specifications.
If the specifications are not satisfied, perform steps 3 and later.

(2) Repeat the mode selection of EJECT to PLAY two or three times. At that time, confirm that the specifications are satisfied.
If the specifications are not satisfied, perform steps 3 and later.

(3) Repeat the mode selection of REV ×5 to PLAY two or three times. At that time, confirm that the specifications are satisfied.
If the specifications are not satisfied, perform steps 3 and later.

#### Entering the REV ×5 mode

Press the PLAY button, then the REW button.
(Both the PLAY and REW buttons on the keyboard light.)

## Adjustment

### 3. TC head position adjustment

Turn the position adjustment nut of the TC head using a box screwdriver and adjust so that the specifications are satisfied.

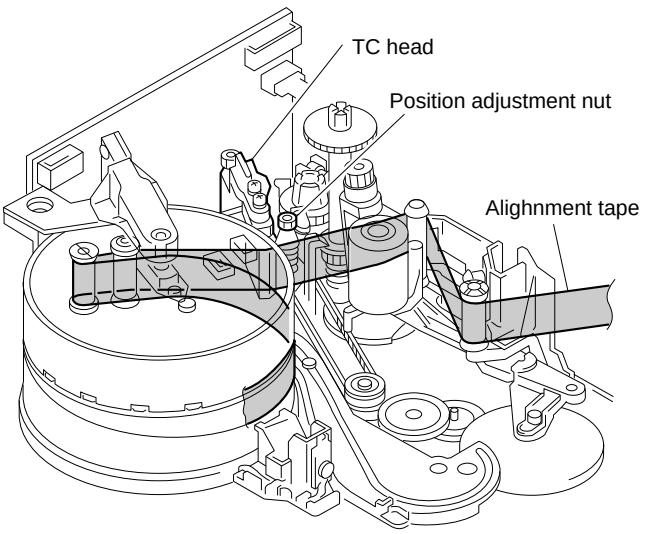
- Turn the adjustment nut counterclockwise. The TC waveform then moves to the right.
- Turn the adjustment nut clockwise. The TC waveform then moves to the left.

### 4. TC head position reconfirmation

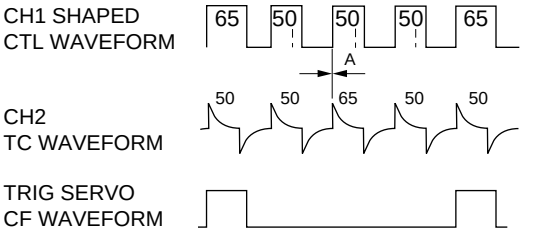
Reconfirm the TC head position according to steps 1 and 2.

### 5. TC head height confirmation

(Refer to section 4-2-5.)

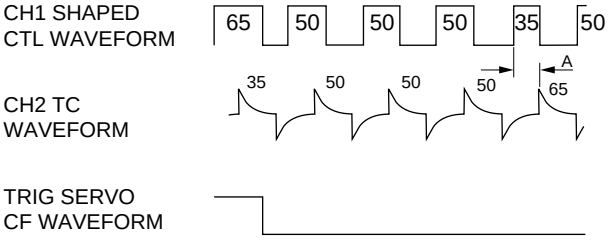



NTSC




Specifications : A = 0 ±600 µs

PAL




DNV-5 — Specifications : A = 6.63 ±0.6 ms

DNW-7 / 7P / 90 / 90P / 90WS / 90WSP — Specifications : A = 0 ±600 µs

# Section 5
# Replacement of Circuit Boards

## 5-1. Replacement of Circuit Boards

**Notes**

- Be sure to turn off the power, then pull out the power cord and/or battery before performing the following procedure. If not, damage to internal circuit may result.
- For the adjustment after board replacement, refer to sections 6 to 9.

### 5-1-1. Circuit Boards in Connector Box

**Note**

Perform the following procedure with the connector box is removed. (For the removal of the connector box, refer to section 1-6 of the Maintenance Manual Part 1.)

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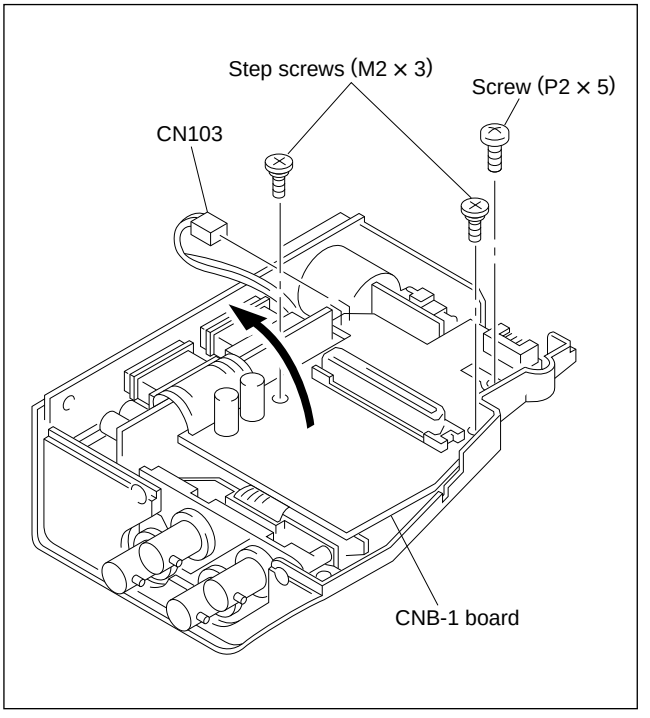
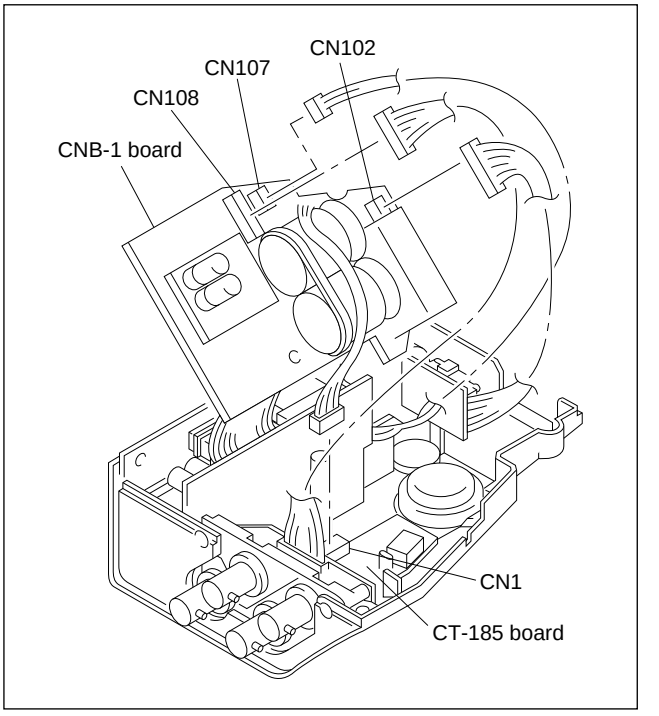
**CNB-1 Board**

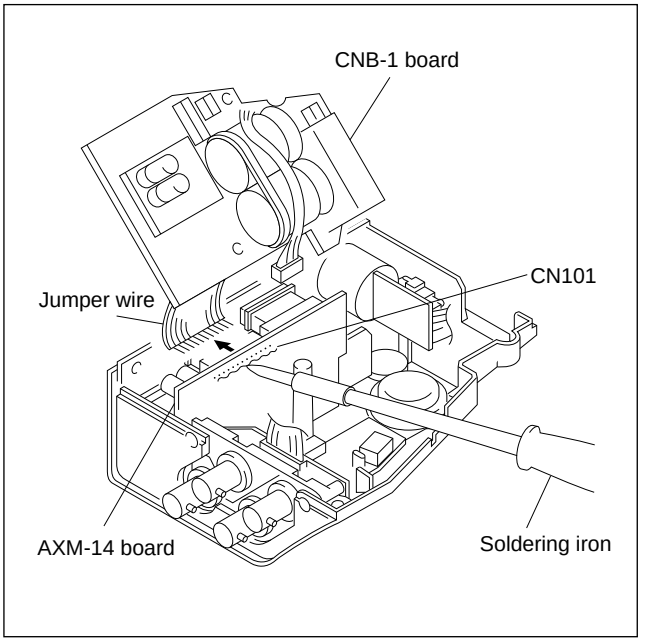
1. Remove the three screws of the CNB-1 board.
2. Disconnect connector CN103, and raise the CNB-1 board in the direction indicated by the arrow.




3. Disconnect connectors CN102, CN107, and CN108.
4. Disconnect connector CN1 on the CT-185 board (for DNV-5 only).

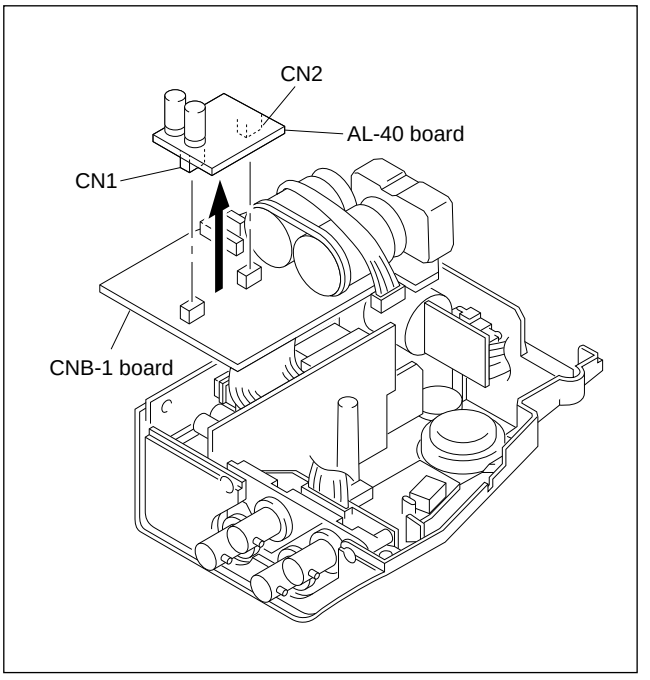



5. Unsolder connector CN101 on the AXM-14 board and remove the jumper wire.
6. After board replacement, install the board in the reverse order of steps 1 to 5.



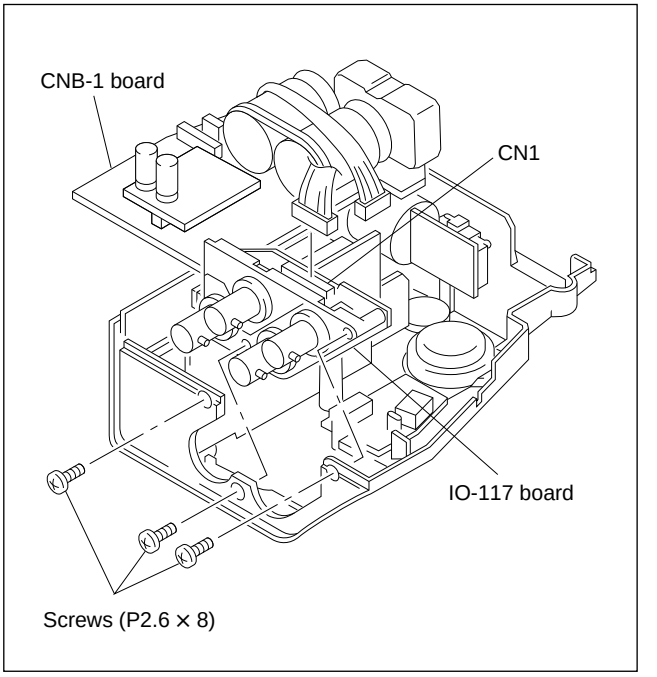
## AL-40 Board

1. Open the CNB-1 board. (Refer to steps 1 to 4 of the CNB-1 board.)
2. Disconnect connectors CN1 and CN2 on the AL-40 board.
3. After board replacement, install the board in the reverse order of steps 1 and 2.



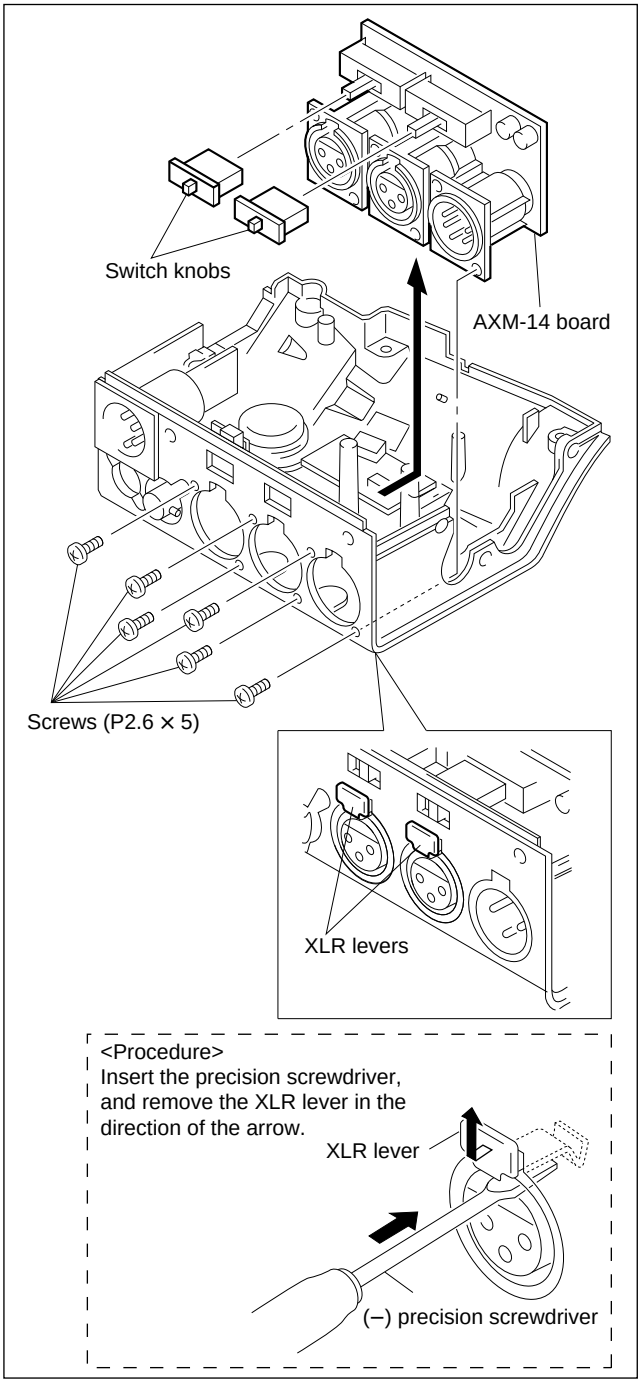

## IO-117 Board

1. Open the CNB-1 board. (Refer to steps 1 to 4 of the CNB-1 board.)
2. Remove the three screws and disconnect connector CN1 on the IO-117 board.
3. After board replacement, install the board in the reverse order of steps 1 and 2.



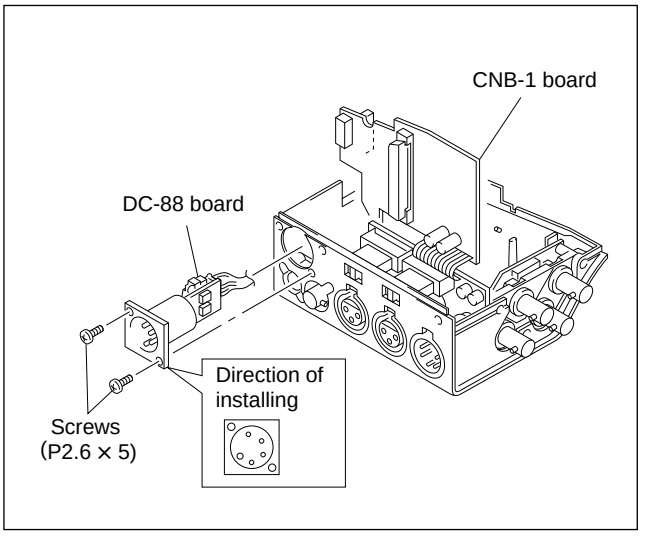
## AXM-14 Board

1. Remove the CNB-1 board. (Refer to steps 1 to 5 of the CNB-1 board.)
2. Remove the IO-117 board. (Refer to steps 1 and 2 of the IO-117 board.)
3. Pull out the two levers of XLR connectors as shown in the figure.
4. Remove the six screws.
5. Remove the two switch knobs.
6. After board replacement, install the board in the reverse order of steps 1 to 5.


Switch knobs
AXM-14 board
Screws (P2.6 × 5)
XLR levers
<Procedure>
Insert the precision screwdriver, and remove the XLR lever in the direction of the arrow.
XLR lever
(–) precision screwdriver

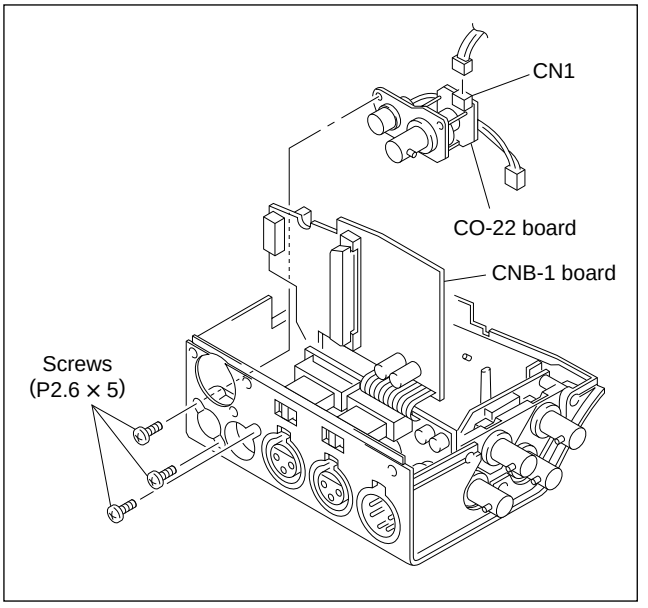
## DC-88 Board

1. Open the CNB-1 board. (Refer to steps 1 to 4 of the CNB-1 board.)
2. Remove the two screws.
3. After board replacement, install the board in the reverse order of steps 1 and 2.



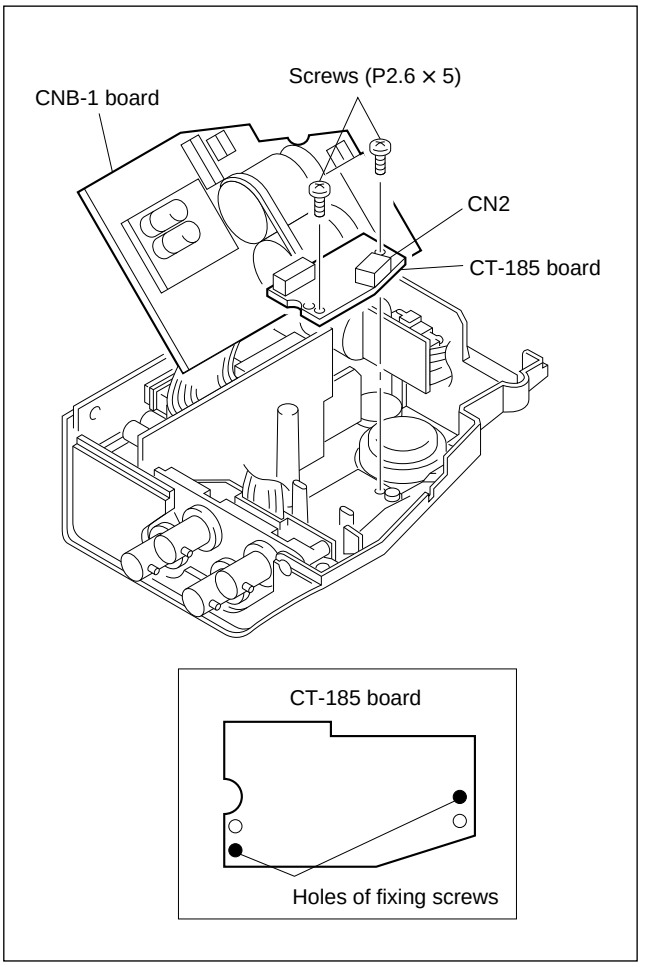

## CO-22 Board

1. Open the CNB-1 board. (Refer to steps 1 to 4 of the CNB-1 board.)
2. Remove the DC-88 board. (Refer to steps 1 and 2 of the DC-88 board.)
3. Remove the three screws and disconnect connector CN1 on the CO-22 board.
4. After board replacement, install the board in the reverse order of steps 1 to 3.



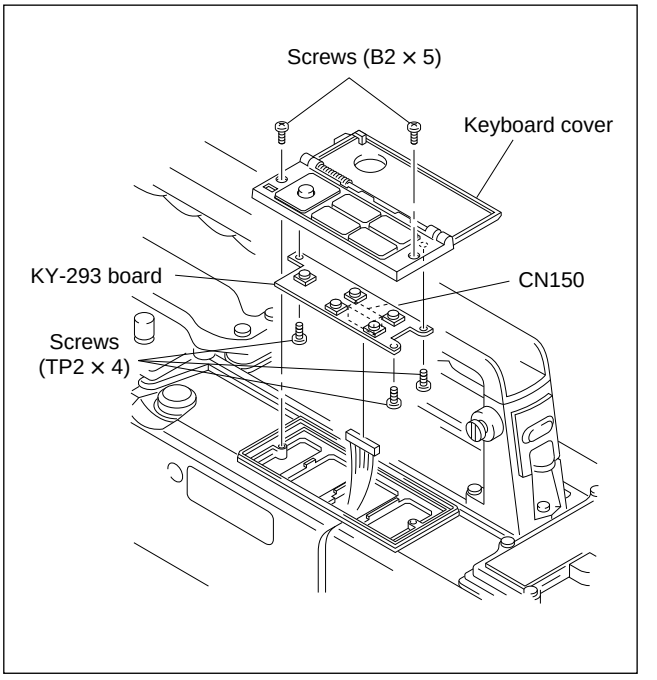
### CT-185 Board (for DNV-5 only)

1. Open the CNB-1 board. (Refer to steps 1 to 4 of the CNB-1 board.)
2. Remove the two screws and disconnect connector CN2 on the CT-185 board.
3. After board replacement, install the board in the reverse order of steps 1 and 2.




## 5-1-2. KY-293 Board

1. Open the keyboard cover.
2. Remove the two screws and disconnect connector CN150 on the KY-293 board.
3. Remove the three screws, then remove the KY-293 board from the keyboard.
4. After board replacement, install the board in the reverse order of step 1 to 3.



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## 5-2. Replacement of Board Used Exclusively for DNW-7/7P/90/90P/90WS/90WSP

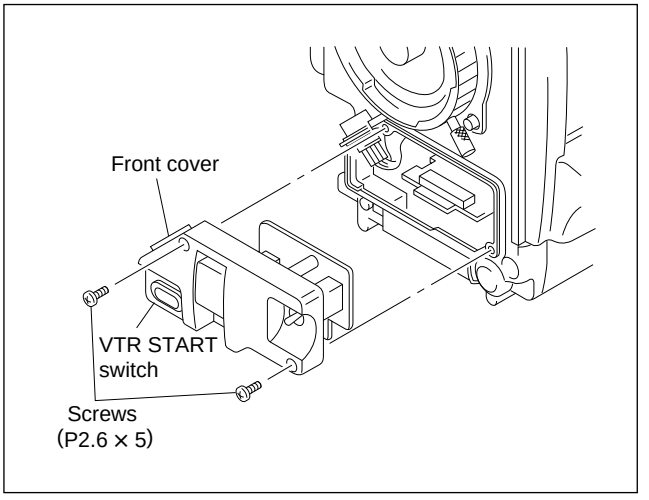
**Notes**

- Be sure to turn off the power, then pull out the power cord and/or battery before performing the following procedure. If not, damage to internal circuit may result.
- For the adjustment after board replacement, refer to sections 6 to 9.

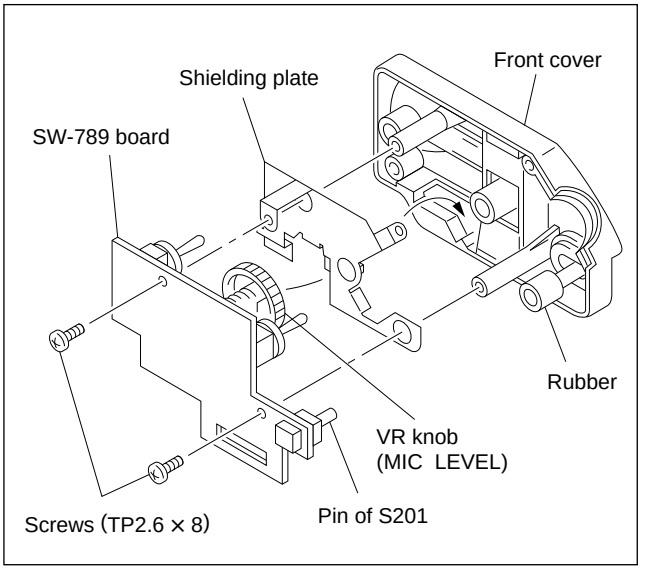
### 5-2-1. SW-789 Board

#### Removal

1. Open the inside panel. (Refer to section 1-6 of the Maintenance Manual Part 1.)
2. Remove the two screws, then remove the front cover.

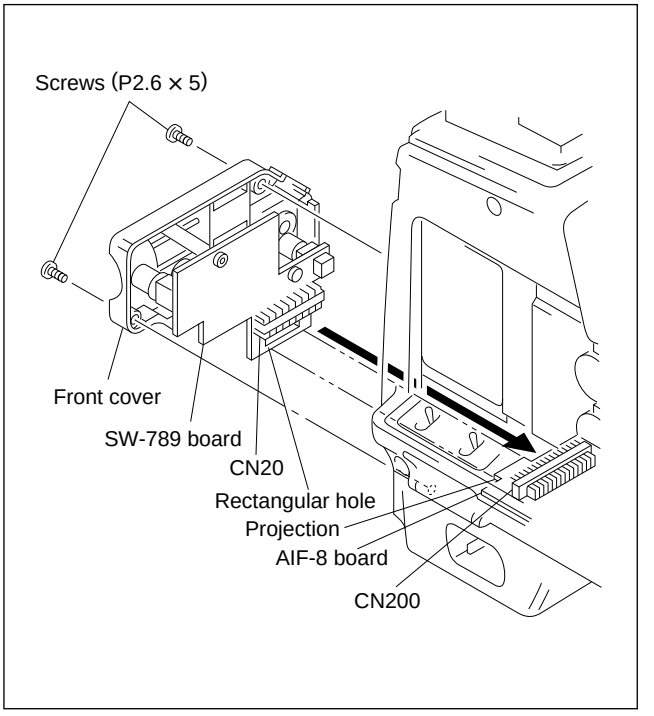



3. Remove the two screws, then remove the SW-789 board from the front cover.



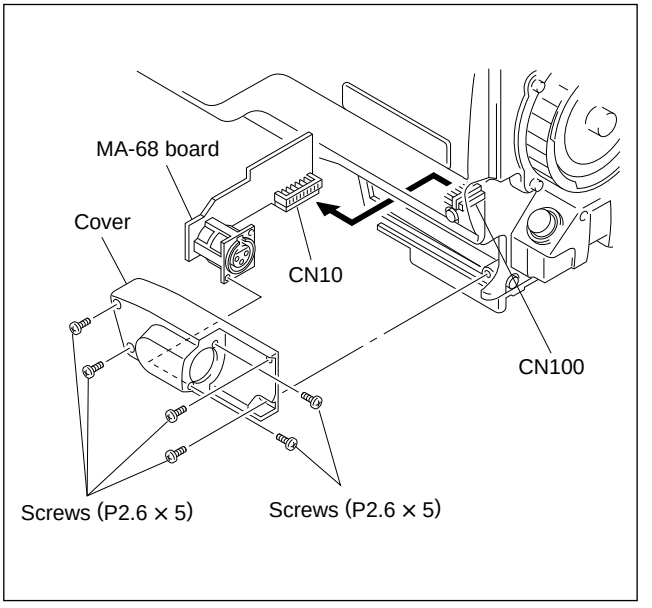

#### Installation

1. Insert the VR knob (MIC LEVEL) of the SW-789 board in which the shielding plate was installed into the hole of the front cover, put the pin of switch S201 in the rubber, and install the board in the front cover with two screws.
   Tightening torque: $52 \times 10^{-2}$ N•m (5.3 kgf• cm)
   After installation, press the VTR START switch and confirm that the click of switch is generated.
2. Check from the inside panel side and connect connector CN20 on the SW-789 board to connector CN200 on the AIF-8 board as the projection of the AIF-8 board is inserted into the rectangular hole of the SW-789 board.
3. Install the front cover with two screws.
   Tightening torque: $52 \times 10^{-2}$ N•m (5.3 kgf• cm)



## 5-2-2. MA-68 Board

1. Remove the outside panel. (Refer to section 1-6 of the Maintenance Manual Part 1.)
2. Remove the six screws, and remove the cover.
3. Disconnect connector CN10 on the MA-68 board from connector CN100 on the AIF-8 board.
4. After board replacement, install the board in the reverse order of steps 1 to 3.




## 5-2-3. AIF-8 Board

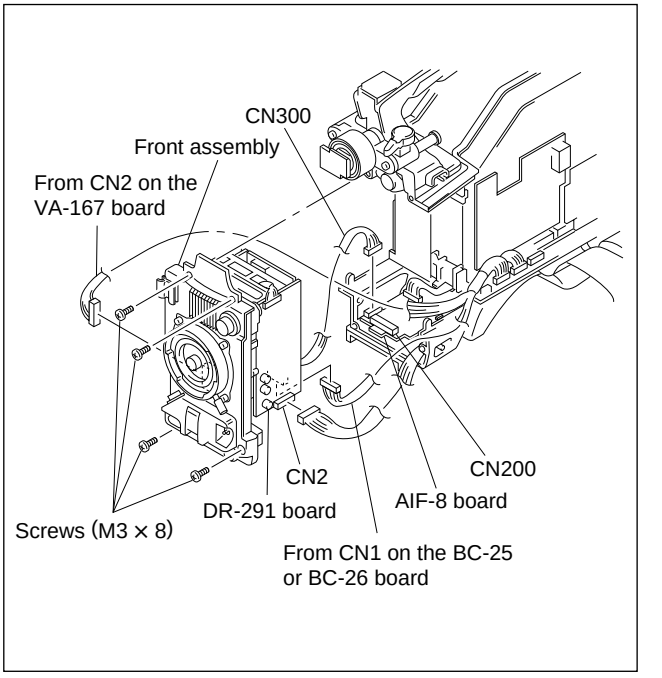
**Note**

To remove the AIF-8 board, remove the front assembly first.

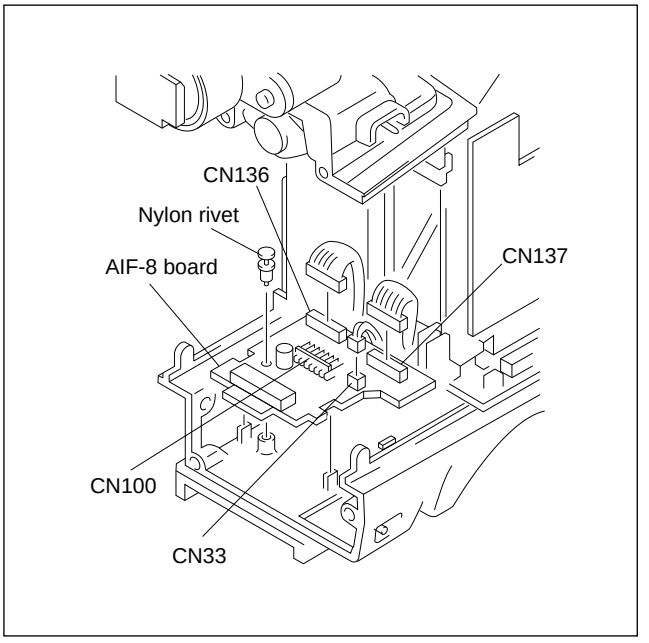
1. Remove the inside panel and outside panel. (Refer to section 1-6 of the Maintenance Manual Part 1.)
2. Remove the four screws, disconnect connectors CN2 on the VA-167 board, CN2 on the DR-291 board, CN1 on the BC-25 or BC-26 board, CN200 and CN300 on the AIF-8 board, and then remove the front assembly.

   **Note**

   BC-25 board:for DNW-7/7P only
   BC-26 board:for DNW-90/90P/90WS/90WSP only



3. Disconnect connectors CN33, CN136, and CN137 on the AIF-8 board.
4. Disconnect connector CN10 on the MA-68 board from connector CN100 on the AIF-8 board. (Refer to section 5-2-2.)
5. Remove the nylon rivet, then remove the AIF-8 board.
6. After board replacement, install the board in the reverse order of steps 1 to 5.



# Section 6
# General Infomation for Electrical Alignment

## 6-1. Notes for Adjustment

Before adjustment, set the POWER switch to ON and the VTR switch to SAVE, and warm up the unit for about 10 munites.

**Indication at the top right of the viewfinder screen**
During adjustment using the setting menu, a bar sometimes appeares at the top right of the viewfinder screen. The bar indicater shows the current setting position and adjustable range for the selected item.

Be sure to set the POWER switch to OFF before extracting the printed circuit board.

## 6-2. Equipment/Fixtures

- Analog composite signal generator
  Tektronix 1410/1411 or equivalent
- Analog component signal generator
  Tektronix TSG-300 or equivalent
- Oscilloscope
  Tektronix 2465B or equivalent
- Waveform monitor/Vectorscope
  Tektronix 1750/1751 or equivalent
- Component serial waveform monitor
  Tektronix WFM601 or equivalent
- Frequency counter
  Advantest TR5821AK or equivalent
- Digital voltmeter
  Advantest TR6845 or equivalent
- Audio Generator
  Tektronix SG-5010 or equivalent
- Audio analyzer
  Tektronix AA501A (OP.02) or equivalent
- Regulated DC power supply
  (12 V variable, more than 5 A)
- AC adapter or batteries
  Sony AC-DN1 or equivalent
- Camera adapter
  Sony CA-701
- VTR composite/component adapter
  Sony VA-5
- Monitor
  Sony BVM-1410 or equivalent
- Pattern box (PTB-500, 90 - 240 Vac)
  J-6029-140-B
- Resolution chart
  J-6026-100-A
- Gray scale chart (4:3)
  J-6026-130-A
- Multi burst chart
  J-6026-110-A
- White window chart
  (Make a square hole at the center of a black sheet of paper.)
- Multi connector cable
  J-6031-840-B
- Alignment tape SR5-1 (NTSC)
  8-960-075-01
- Alignment tape SR5-1P (PAL)
  8-960-075-51
- Alignment tape SR2-1 (NTSC)
  8-960-075-11
- Alignment tape SR2-1P (PAL)
  8-960-075-61
- Blank tape *1
  BCT-60SX
- Extension board (EX-501/541/542, Stays)
  A-8312-804-A

*1 : “Blank tape” means a cassette tape on which no video/audio signals are recorded.

## 6-3. Data Structure of the SETUP Menu

The menu has the following data structure.
Set value of the data (or adjust value) = fixed data (absolute value) + set value of the SVC mode (relative value) + set value of the ENG mode (relative value) + set value of the USER mode (relative value)

- The fixed data is stored in IC74 (this IC is mounted in the IC socket (CNI1) on the DCP-1 board), and the set values of the USER, ENG and SVC modes are stored in IC152 (on the DCP-1 board).
- The set values of the USER, ENG and SVC modes are set to 0 when the unit is shipped from the factory. Execute the DATA RESET of each mode to return to the factory shipping data. (The adjustment is required.)

### 1. SVC mode

- The replacement boards for repair purpose supplied from the repair parts center is adjusted at the factory. However, due to the variability of respective products, perform the adjustment using the SVC mode after the board replacement, or when you require the fine-adjustment.
- When adjustment is performed using the SVC mode, the values of items adjusted in the ENG mode and the USER mode become 0.

### 2. Setup card

- The set values of the USER mode and ENG mode are stored separately in the setup card.
- The set value at the factory is stored as fixed data. This value may differ for each unit. The [fixed data + set value in SVC mode] in each state must be made the same when an identical setup card is used before and after board replacement or between different units.
  It is recommended to store the set values of the USER mode and the ENG mode beforehand in the setup card using the reference unit. Then perform adjustment using the SVC mode for the unit after the board replacement is performed or another unit, and download the stored data from the setup card.

## 6-4. Test Signals

Alignment tape SR5-1 (Part No. 8-960-075-01)
SR5-1P (Part No. 8-960-075-51)

| TIME min. sec. | D-AUDIO | VIDEO | CTL |
|---|---|---|---|
| 00 : 00 | | | |
| 02 : 00 | 1 kHz, −20 dB FS | 100% Color bars | CTL |
| 04 : 00 | 1 kHz, 0 dB FS | | |
| 06 : 00 | −∞ dB FS | | |
| 08 : 00 | 20 Hz, −20 dB FS | | |
| 10 : 00 | 20 kHz, −20 dB FS | | |
| 12 : 00 | 1 kHz, −20 dB FS | Ramp | CTL |
| 14 : 00 | 1 kHz, 0 dB FS | | |
| 16 : 00 | −∞ dB FS | | |
| 18 : 00 | 20 Hz, −20 dB FS | | |
| 20 : 00 | 20 kHz, −20 dB FS | | |
| 22 : 00 | 1 kHz, −20 dB FS | 100% Color bars | CTL |
| 24 : 00 | 1 kHz, 0 dB FS | | |
| 26 : 00 | −∞ dB FS | | |
| 28 : 00 | 20 Hz, −20 dB FS | | |
| | 20 kHz, −20 dB FS | | |

Alignment tape SR2-1 (Part No. 8-960-075-11)
SR2-1P (Part No. 8-960-075-61)

| TIME min. sec. | VIDEO/AUDIO | CTL | AUX |
|---|---|---|---|
| 00 : 00 | 3.212 MHz *1 (A-ch only) | CTL | 3 kHz, 0 VU (NTSC) 3.15 kHz, 0 VU (PAL) |
| (CTL PULSE) | | | |
| 15 : 00 | A-ch : 3.212 MHz *1 B-ch : 6.424 MHz *1 | CTL | 3 kHz, 0 VU (NTSC) 3.15 kHz, 0 VU (PAL) |
| 20 : 00 | 12.848 MHz *1 (All channels) | CTL | 3 kHz, 0 VU (NTSC) 3.15 kHz, 0 VU (PAL) |
| 25 : 00 | 100% color bars (All channels) | CTL | ——— |
| 27 : 00 | | | |

∗1: When playing back this portion with DNV-5 or DVW-7/90/90WS, the output signal from the unit will become a third in frequency.

## 6-5. Description of Nonvolatility Memory's Data

Explains the holding data of nonvolatility memories on the boards.
When replace the following boards, remove the nonvolatility memory on the old board and attach it on the new board.

**Note**

When the nonvolatility memory is replaced with a blank memory, the setup operation is needed.
If the memory is replaced, please consult your Sony service representative.

| Board name | Ref. number | Data |
|---|---|---|
| TC-80 | IC711 | Hours meter data<br>VTR mode setting data<br>Equalizer adjustment data<br>Video recording current adjustment data<br>IF-634 board adjustment data (DNV-5 only) |
| AIF-8 | IC102 | Machine-specific setting data |

## 6-6. Electrical Adjustment After Replacement of Block or Board

| Block name/board name | Adjustments |
|---|---|
| CCD block | 8-3. AD Clock Phase Adjustment |
| DCP-1 board | 8. Camera System Adjustment (When you require the fine-adjustment.) |
| DVP-1 board | 7-8. Equalizer Adjustment<br>7-9. Recording Current Adjustment |
| TC-80 board | 7-2-1. Battery End Detection Voltage Adjustment<br>Adjust the voltage after removing IC711 on the old board and attaching it on the new board. |
| AIF-8 board | Remove IC102 on the old board and attach it on the new board. |
| Other board | No adjustment is required after board replacement |
| Drum | 7-8. Equalizer Adjustment<br>7-9. Recording Current Adjustment |
| Capstan motor | 7-3. Servo System Adjustment |
| Timing belt | 7-3. Servo System Adjustment |

# Section 7
# VTR System Alignment

## 7-1. Preparation

### Precaution

The DNV-5 has a selection switch for NTSC or PAL mode. (If the adjustment is complete in the one mode, no adjustment is required in the other mode.)
Before beginning the adjustment in this section, be sure to check the setting of this switch.

### Initial Settings

[Inside panel]

| | |
|---|---|
| VTR switch | → STBY |
| GAIN switch | → L (0 dB) |
| OUTPUT/DCC switch | → CAM/OFF |
| WHITE BAL switch | → PRST |
| AUDIO IN CH-1 switch | → REAR |
| AUDIO IN CH-2 switch | → REAR |
| AUDIO SELECT CH-1 switch | → AUTO |
| AUDIO SELECT CH-2 switch | → AUTO |
| F-RUN/SET/R-RUN switch | → R-RUN |
| REAL TIME switch | → OFF |
| DISPLAY switch | → TC |

[Connector box]

| | |
|---|---|
| AUDIO IN CH-1 LINE/MIC switch | → LINE |
| AUDIO IN CH-2 LINE/MIC switch | → LINE |

### Activate into the adjustment mode

Perform the following item before adjustment in this section.

1. While holding the RESET button down on the inside panel, turn off the POWER switch.
2. While holding the HOLD button down on the inside panel, turn on the POWER switch.
   When LCD display appears, release the HOLD button.

### Exit the adjustment mode

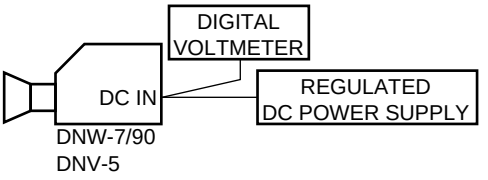
1. Turn the POWER switch to OFF/ON.

## 7-2. Power System Adjustment

### 7-2-1. Battery End Detection Voltage Adjustment

#### Preparation

- Connect as follows.



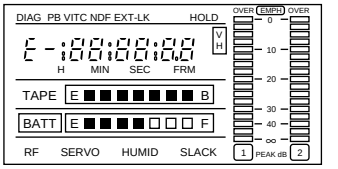

- Supply +12 V dc to DC IN connector.

#### Adjustment procedure

1. Insert the blank tape and put the unit into the REC mode.
2. Test point : DC IN connector
   Adjust the voltage of the Regulated DC power supply for the specification.
   Spec. : 11.28 ±0.02 V dc
3. Press the DIAG button on the inside panel to put the unit into the DIAG menu.
4. Continuously hold the HOLD button down on the inside panel and confirm that the WARNING indicator lights up momentarily.
   If not, Repeat from step 1.

#### Check procedure

1. Put the unit into the STOP mode.
2. Turn off and on the POWER switch.
3. Test point : DC IN connector
   Adjust the voltage of the Regulated DC power supply for the specifications.
   Spec. : 12.00 ±0.02 V dc
4. Put the unit into the REC mode.
5. Confirm that the following indicators on the LCD light as follows.
   BATT : Lights up
   E : Lights up
   BATT status indicator : Four or five left rectangles light up.




LCD display screen

# 7-3. Servo System Adjustment

## 7-3-1. Automatic Servo Adjustment

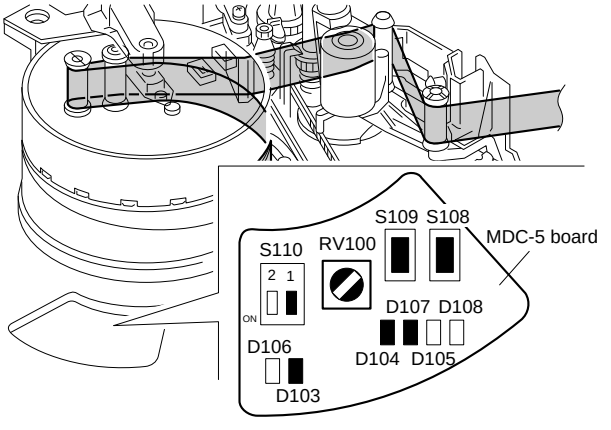
### Adjustment procedure

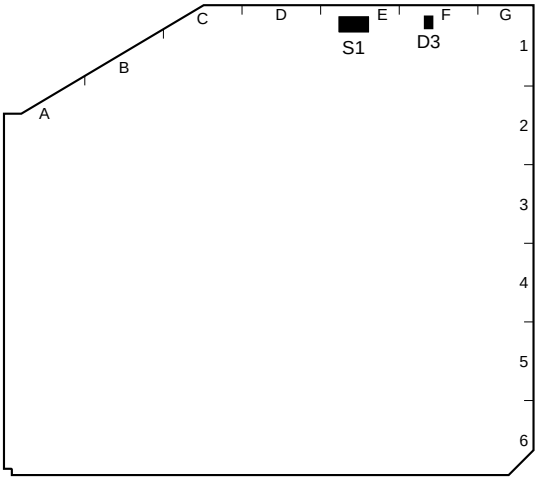
1. S110-1 (MDC-5 board) → ON
   D103 indicator on the MDC-5 board blinks.
2. Press S108 button on the MDC-5 board one time and confirm that D104 indicator lights up.
3. Insert a blank tape (BCT-60SX or equivalent).
   (During the interval from 20 minute to 30 minute of the tape)
4. Press S109 button on the MDC-5 board for a second or more and release to execute the automatic adjustment mode.
   (It takes about a minute to complete this automatic adjustment.)
   - Capstan FG duty ratio adjustment
   - Capstan free speed adjustment
   - Composite shooting delay adjustment
5. After adjustment is normally completed, the tape is automatically ejected.
   (Turn off the power 10 seconds or more after finishing the adjustment, if required.)
   If the adjustment is not normally completed, repeat from step 1 (the VTR enters to the STOP mode).
6. S110-1 (MDC-5 board) → OFF
   D103 indicator on the MDC-5 board goes out.

## 7-3-2. Automatic PG Phase Adjustment

### Adjustment procedure

1. S110-1 (MDC-5 board) → ON
   D103 indicator on the MDC-5 board blinks.
2. S1-8 (DVP-1 board) → ON
   D3 indicator on the DVP-1 board lights up and the unit goes into the recording head playback mode.
3. Press S108 switch on the MDC-5 board two times (A press of button shall be within a second.)
   D107 indicator on the MDC-5 board lights up.
4. Insert the alignment tape (SR2-1/1P) and play back the 8T recorded portion (TIME;00:00:00:00 - 00:15:00:00).
5. ⊘RV100 (MDC-5 board) → Mechanical center
6. Press S109 button on the MDC-5 board for a second or more and release to executed the automatic adjustment mode.
   (It takes about several seconds to one minute to finish this automatic adjustment.)
   - PG phase adjustment
7. After adjustment is normally completed, the tape is automatically ejected.
   (Turn off the power 10 seconds or more after finishing the adjustment, if required.)
   If the adjustment is not normally completed, repeat from step 3 (the VTR enters to the STOP mode).
8. S1-8 (DVP-1 board) → OFF
   S110-1 (MDC-5 board) → OFF
   D103 indicator on the MDC-5 board goes out.




DVP-1 BOARD (A SIDE)

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# 7-4. Audio System Adjustment

## 7-4-1. D/A Level Adjustment

### Preparation

- Insert the alignment tape (SR5-1/1P) and play back an 1 kHz, −20 dB FS portion (TIME;00:00:00:00 - 00:02:00:00).

### Adjustment procedure

1. Equipment : Audio analyzer
   Test point : AUDIO OUT connector (rear panel)
   CH1(X) : pin-2
   CH1(Y) : pin-3
   GND : pin-1
   Adj. point : ⊘RV501 (TC-80 board)
   Spec. : 0.0 ±0.1 dBm (600 Ω)

2. Equipment : Audio analyzer
   Test point : AUDIO OUT connector (rear panel)
   CH2(X) : pin-4
   CH2(Y) : pin-5
   GND : pin-1
   Adj. point : ⊘RV502 (TC-80 board)
   Spec. : 0.0 ±0.1 dBm (600 Ω)

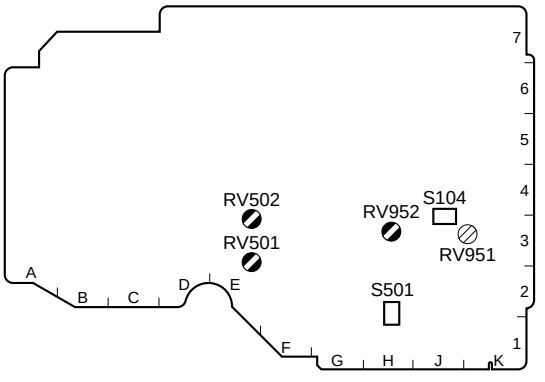
## 7-4-2. Output Limiter Adjustment

### Preparation

- S501 (TC-80 board) → ON (CH-1 Output Limiter ON)
- Insert the alignment tape (SR5-1/1P) and play back an 1 kHz, 0 dB FS portion (TIME;00:02:00:00 - 00:04:00:00).

### Adjustment procedure

1. Equipment : Audio analyzer
   Test point : AUDIO OUT connector (rear panel)
   CH1(X) : pin-2
   CH1(Y) : pin-3
   GND : pin-1
   Adj. point : ⊘RV952 (TC-80 board)
   Spec. : 9.0 ±0.2 dBm (600 Ω)




TC-80 BOARD (B SIDE)

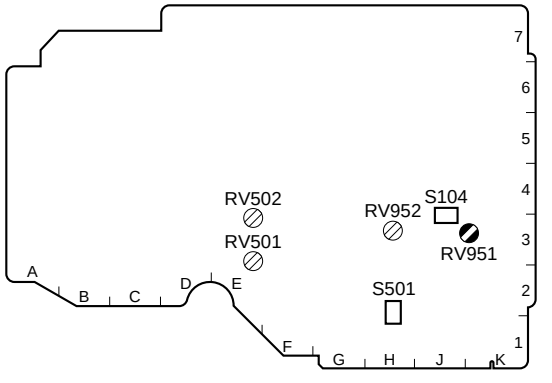
### 7-4-3. AGC Level Adjustment

#### Preparation

- AUDIO SELECT CH1 switch (inside panel) → AUTO
- AUDIO IN CH1 switch (inside panel) → REAR
- AUDIO IN CH1 switch (inside panel) → REAR
- LINE/MIC CH1 switch (rear panel) → LINE
- S104 (TC-80 board) → OFF (CH-1 Limiter OFF)
- Input an 1 kHz, +4.0 dBu sine wave to the AUDIO IN CH-1 connector.

#### Adjustment procedure

1. Equipment : Audio analyzer
   Test point : AUDIO OUT connector (rear panel)
   CH1(X) : pin-2
   CH1(Y) : pin-3
   GND : pin-1
   Adj. point : ⊘RV951 (TC-80 board)
   Spec. : 0.0 ±0.2 dBm (600 Ω)

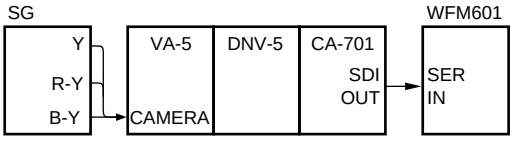


TC-80 BOARD (B SIDE)

## 7-5. Input Level Adjustment (DNV-5 only)

#### Preparation

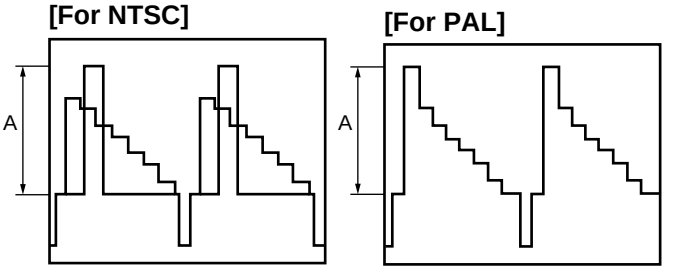
- Connect as follows.
- Input a color-bar signal to the CAMERA connector on the VA-5.
  NTSC : 75% color bars
  PAL : 100% color bars




### 7-5-1. Y Input Level Adjustment

#### Adjustment procedure

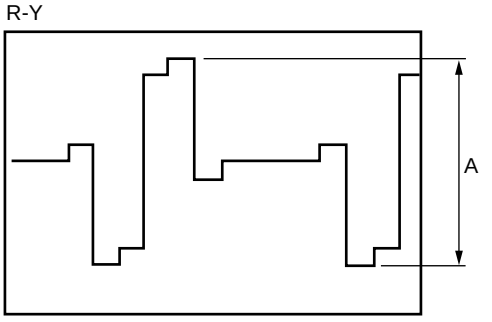
1. Equipment : Waveform monitor
   Test point : SDI OUT connector (CA-701)
2. On the DIAG menu, adjust as follows.
   PAGE : DIAG G-2 (REC VIDEO ADJ DATA-2)
   ITEM : 1 (Y LEVEL)
   Spec. : A = 700 ±5 mV



## 7-5-2. R-Y Input Level Adjustment

### Adjustment procedure

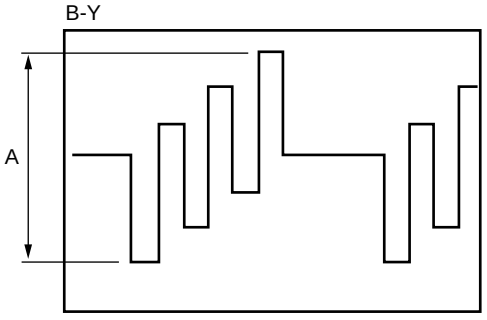
1. Equipment : Waveform monitor
   Test point : SDI OUT connector (CA-701)
2. On the DIAG menu, adjust as follows.
   PAGE : DIAG G-2 (REC VIDEO ADJ DATA-2)
   ITEM : 2 (R-Y LEVEL)
   Spec. : A = 525 ±5 mV (NTSC)
   : A = 700 ±7 mV (PAL)




## 7-5-3. B-Y Input Level Adjustment

### Adjustment procedure

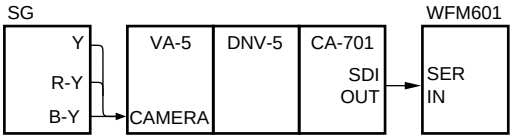
1. Equipment : Waveform monitor
   Test point : SDI OUT connector (CA-701)
2. On the DIAG menu, adjust as follows.
   PAGE : DIAG G-2 (REC VIDEO ADJ DATA-2)
   ITEM : 3 (B-Y LEVEL)
   Spec. : A = 525 ±5 mV (NTSC)
   : A = 700 ±5 mV (PAL)



# 7-6. Y/C Delay Adjustment (DNV-5 only)

### Preparation

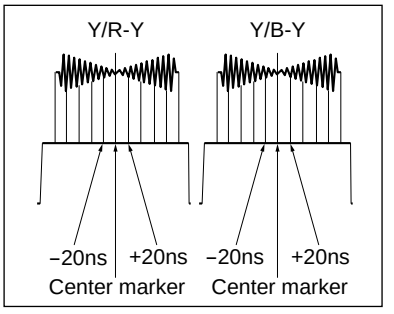
- Connect as follows.
- Input a bowtie signal to the camera connector on the VA-5.
- Put into the BOWTIE mode to the waveform monitor.




## 7-6-1. R-Y Delay Adjustment

### Adjustment procedure

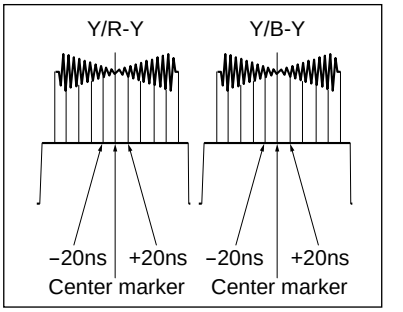
1. Equipment : Waveform monitor
   Test point : SDI OUT connector (CA-701)
2. On the DIAG menu, adjust as follows.
   PAGE : DIAG G-1 (REC VIDEO ADJ DATA-1)
   ITEM : 2 (R-Y DELAY)
   Spec. : 0 ±5 ns




## 7-6-2. B-Y Delay Adjustment

### Adjustment procedure

1. Equipment : Waveform monitor
   Test point : SDI OUT connector (CA-701)
2. On the DIAG menu, adjust as follows.
   PAGE : DIAG G-1 (REC VIDEO ADJ DATA-1)
   ITEM : 3 (B-Y DELAY)
   Spec. : 0 ±5 ns



### 7-6-3. Storing the Adjustment Data

#### Setting procedure

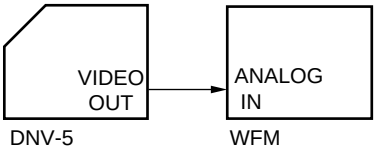
1. Press the RESET switch on the inside panel.

2. Confirm that “G:O” is displayed on the LCD screen.

## 7-7. Play Back System Adjustment (DNV-5 only)

#### Preparation

• Connect as follows.



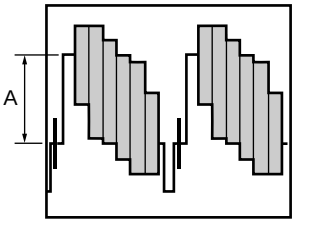

### 7-7-1. Playback Level Adjustment

#### Preparation

• Insert the alignment tape (SR5-1/1P) and play back a 100% color bars portion (TIME;00:00:00:00 - 00:10:00:00).

#### Adjustment procedure

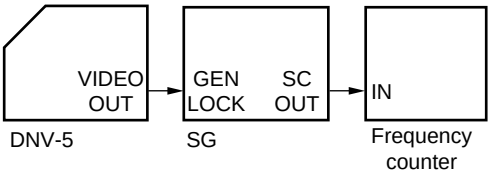
1. Equipment : Waveform monitor
   Test point : DA OUT connector (DAC-422)
2. On the DIAG menu, adjust as follows.
   PAGE : DIAG F (PB VIDEO ADJ DATA)
   ITEM : 1 (V LEVEL)
   Spec. : A = 714 ±5 mV (NTSC)
   : A = 700 ±5 mV (PAL)



## 7-7-2. Burst Frequency Adjustment

### Preparation

• Connect as follows.




### Adjustment procedure

1. Equipment : Frequency counter
   Test point : VIDEO OUT connector
2. On the DIAG menu, adjust as follows.
   PAGE : DIAG F (PB VIDEO ADJ DATA)
   ITEM : 1 (INT BURST FRQ)
   Spec. : 3,579,545 ±5 Hz (NTSC)
   4,433,618 ±5 Hz (PAL)

## 7-7-3. Storing the Adjustment Data

### Setting procedure

1. Push the RESET switch on the inside panel.
2. Confirm that “F:O” is displayed on the LCD screen.

# Section 8
# Camera System Alignment

## 8-1. Initial Setting for Switches

Execute the camera system alignment using the SVC mode in the SETUP menu. When the setting mode is changed SVC, set switches as follows.

1. Set the POWER switch to off.
2. S4-1 (DCP-1 board) → ON
3. Turn the power ON.
4. Set the MENU switch ON.

**Note**

When adjustment is performed in the SVC mode, the values of items adjusted in the ENG and USER mode become 0.

### Initial Setting

Before performing adjustment, set switches as follows, If the setting of the GAIN switch is changed from the factory set value, reset it to its original value by referring to the operation manual.

Inside panel:

| | |
|---|---|
| VTR SAVE/STBY switch | → STBY |
| GAIN switch | → L (0 dB) |
| OUTPUT/DCC switch | → CAM/OFF |
| MENU switch | → OFF |
| WHITE BAL switch | → PRST |

Front panel:

| | |
|---|---|
| SHUTTER switch | → OFF |
| Filter selector | → 1 |

Lens :

| | |
|---|---|
| LENS | → MANU |
| IRIS | → (CLOSE) |

SETUP menu:

- MASTER GAIN
  - LOW → 0 dB
  - MID → 9 dB
  - HIGH → 18 dB
- FUNCTION 1/2
  - TEST OUT → ENC
  - DATAIL → ON
  - SKIN TONE DTL → OFF
  - MATRIX → OFF
  - GAMMA → ON
  - CHROMA → ON
  - TEST SAW → OFF
- FUNCTION 2/2
  - GENLOCK → ON
  - CAM RET → OFF
  - FILTER INH → ON
- LEVEL 3
  - KNEE SELECT → ON
  - WHITE CLIP → ON
- LEVEL 4
  - R-Y → ON
  - B-Y → ON

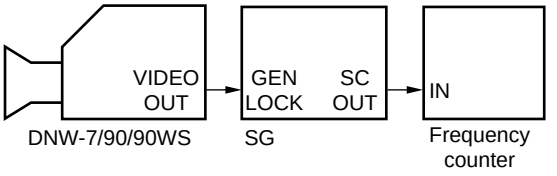
## 8-2. VCO CONT Frequency Check

### Note

- Conduct this check when the TG-161, TG-164, ES-11 board or CCD block is only replaced.
- Before measurement, turn the power ON and warm up the camcorder for about 10 munites.

### Preparation

- Connect as follows.



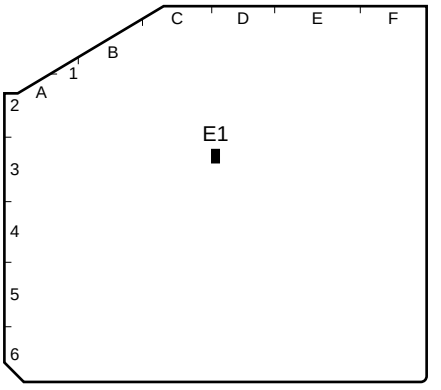

- On the setting menu, set as follows.
  PAGE : FUNCTON 1/2
  ITEM : TEST OUT → ENC

### Adjustment procedure

1. Equipment : Frequency counter, Oscilloscope
   Test point : VIDEO OUT connector
   GND : E1 (DCP-1 board)
   Spec. : 3,579,545 ±10 Hz (NTSC)
   4,433,618 ± 5 Hz (PAL)

If the measured value is out of the specification, adjust it as follows.

2. On the setting menu, adjust as follows.
   PAGE : ENC ADJUSTMENT
   ITEM : FSC FREQ. → INT
   Spec. : 3,579,545 ±10 Hz (NTSC)
   4,433,618 ±5 Hz (PAL)




**DCP-1 Board A side**

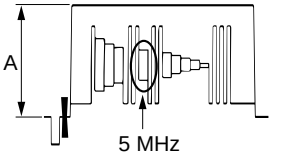
## 8-3. AD Clock Phase Adjustment

### Note

- Conduct this check when the CCD block or DCP-1 board is only replaced.

### Preparation

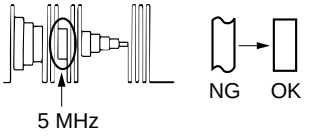
- On the setting menu, set as follows.
  PAGE : FUNCTON 1/2
  ITEM : TEST OUT → ENC
- OUTPUT/DCC switch (inside panel) → CAM/ON
- WHITE BAL switch (inside panel) → A
- AUTO W/B BAL switch (front panel) → WHT
  (Perform the automatic white balance adjustment.)
- Shoot a multiburst chart in the underscan's picture frame.
  setting point : ⊘ Lens IRIS
  Spec. : A (white level) = 90 ± 2 IRE (NTSC)
  A = 630 ±10 mV (PAL)




- Pan the camera so that the 5 MHz signal portion of the multiburst chart is positioned at the center of the monitor screen. (Do not change the camera zoom.)

### Adjustment procedure

1. On the setting menu, adjust as follows.
   PAGE : AD ADJ.
   ITEM : AD CLK PHASE
   Spec. : Maximize the 5 MHz signal portion.
2. On the setting menu, adjust as follows.
   PAGE : AD ADJ.
   ITEM : R/B CLK PHASE
   Spec. : Adjust the 5 MHz signal portion to nearly horizontal.



# 8-4. ENC OUT Adjustment

## 8-4-1. ENC Level Adjustment

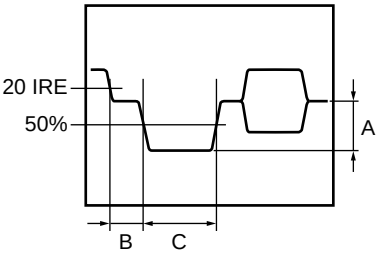
### Preparation

• OUTPUT/DCC switch (inside panel) → BARS

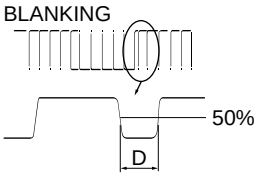
### Adjustment procedure

Equipment: Waveform monitor
Test point: VIDEO OUT connector

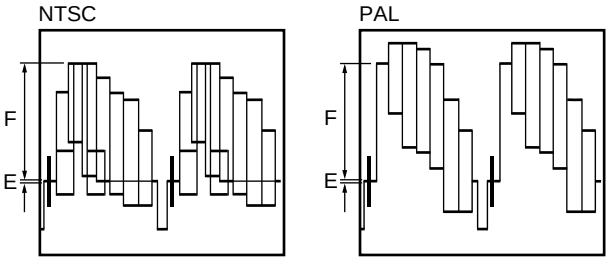
1. On the setting menu, adjust as follows.
   PAGE : LEVEL 5
   ITEM : ENC SYNC LEVEL
   Spec. : A = 40 ±1 IRE (NTSC)
   A = 300 ±7 mV (PAL)
2. On the setting menu, adjust as follows.
   PAGE : ENC ADJUSTMENT
   ITEM : SYNC START




   Spec. : B = 1.5 ± 0.1 µs (NTSC)
   B = 1.65 ± 0.1 µs (PAL)
3. On the setting menu, adjust as follows.
   PAGE : ENC ADJUSTMENT
   ITEM : SYNC STOP
   Spec. : C = 4.7 ± 0.1 µs
4. Check as follows.
   Spec. : D = 2.3 ± 0.1 µs




5. On the setting menu, adjust as follows.
   PAGE : LEVEL 5
   ITEM : ENC SETUP LEV.
   Spec. : E = 7.5 ± 0.5 IRE (NTSC)
   E = 0 ± 3 mV (PAL)
6. On the setting menu, adjust as follows.
   PAGE : LEVEL 5
   ITEM : ENC Y LEV.
   Spec. : F = 100 ± 2 IRE (NTSC)
   F = 700 ±14 mV (PAL)



## 8-4-2. Chroma Adjustment

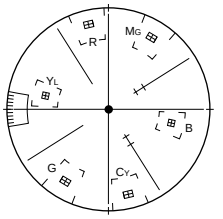
### Preparation

- Connect a waveform monitor to the TEST OUT and vectorscope to the VIDEO OUT connectors respectively.
- OUTPUT/DCC switch (inside panel) → BARS

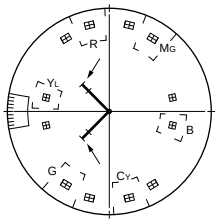
### Adjustment procedure

Test point: VIDEO OUT connector

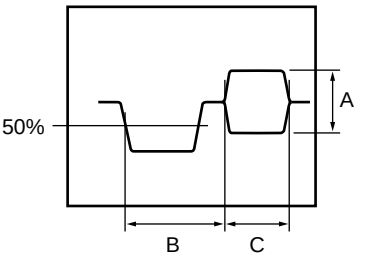
1. Setting of vectorscope.
   GAIN : MAX
2. On the setting menu, adjust as follows.
   PAGE : ENC ADJ.
   ITEM : R-Y CAR. BAL.
   B-Y CAR. BAL.
   Spec. : Adjust the illuminated spot at the center of the vectorscope.




3. Setting of vectorscope.
   GAIN : ×1
4. On the setting menu, adjust as follows.(For only PAL)
   PAGE : LEVEL 4
   ITEM : BURST PHASE
   BURST LEVEL
   Spec. : Position the burst signal on the defined axes and levels.




5. On the setting menu, adjust as follows.
   (PAL: Check only)
   PAGE : LEVEL 4
   ITEM : BURST LEVEL
   Spec. : A = 40 ±1 IRE (NTSC)
   A = 280 ±7 mV (PAL)

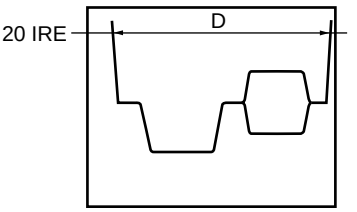



6. On the setting menu, adjust as follows.
   PAGE : ENC ADJUSTMENT
   ITEM : BURST START
   Spec. : B = 5.3 ± 0.1 µs (NTSC)
   B = 5.6 ± 0.1 µs (PAL)
7. On the setting menu, adjust as follows.
   PAGE : ENC ADJUSTMENT
   ITEM : BURST STOP
   Spec. : C = 9 cycles (NTSC)
   C = 2.25 ± 0.2 µs (PAL)
8. Position the burst spot on the defined axis.
9. Adjust as follows using the setting menu and ⊘FL12.
   PAGE : LEVEL 4
   ITEM : R-Y LEVEL
   B-Y LEVEL
   Adj. point : ⊘FL12 (ES-11 board)
   Spec. : Place the illuminated spots inside the corresponding frames (DP: ±2.5 degree, DG: ±2.5%) on the vectorscope.

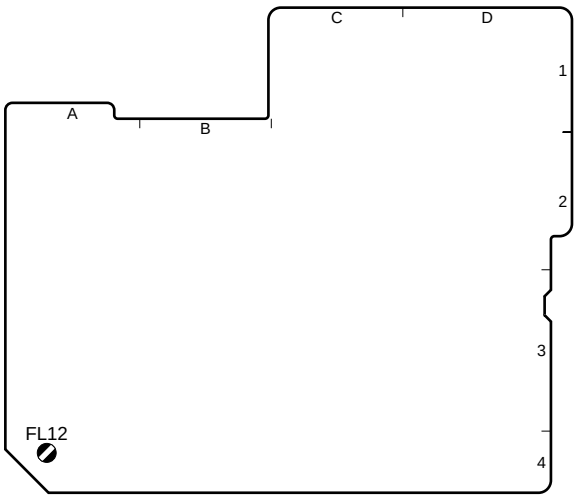
http://getMANUAL.com



10. On the setting menu, adjust as follows.
    PAGE : SG ADJUSTMENT
    ITEM : H BLKG
    Spec. : D = 10.9 ± 0.2 µs (NTSC)
    D = 12.0 ± 0.3 µs (PAL)




11. On the setting menu, set as follows. (For only NTSC)
    PAGE : SG ADJ.
    ITEM : V BLKG WIDTH
    Spec. : 19H, 20H or 21H




**ES-11 Board A side**

## 8-4-3. INT SC Phase Adjustment

### Note

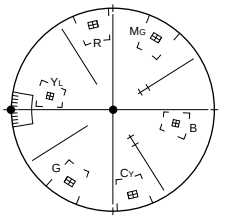
- The following adjustment procedures are described under the condition by using the Tektronix 1750/1751. If any other measuring instrument is used, perform the adjustment according the operation manual attached to it.

### Preparation

- Connect the SC-H phase measuring instrument to the TEST OUT connector.
- On the setting menu, set as follows.
  PAGE : LEVEL 7
  ITEM : TEST OUT → ENC

### Adjustment procedure

1. On the setting menu, adjust as follows.
   PAGE : LEVEL 9
   ITEM : SC PHASE
   Spec. : Coincide the beam spot of the burst (SC) with the direction of the beam spot of H.




### Setting after adjustment

- Connect the waveform monitor to the TEST OUT connector.

## 8-5. TEST OUT Level Adjustment

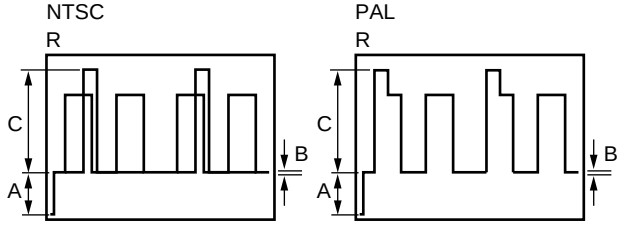
### Preparation

- OUTPUT/DCC switch (inside panel) → BARS
- On the setting menu, set as follows.
  PAGE : LEVEL 7
  ITEM : TEST OUT → R, G or B

### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, adjust as follows.
   PAGE : LEVEL 5
   ITEM : RGB SYNC LEV.
   Spec. : A = 40 ± 2 IRE (NTSC)
   A = 300 ±14 mV (PAL)
2. On the setting menu, adjust as follows.
   PAGE : LEVEL 5
   ITEM : RGB SETUP LEV.
   Spec. : B = 7.5 ± 0.5 IRE (NTSC)
   B = 0 ± 3 mV (PAL)
3. On the setting menu, adjust as follows.
   PAGE : LEVEL 5
   ITEM : RGB LEVEL
   Spec. : C = 100 ± 2 IRE (NTSC)
   C = 700 ±14 mV (PAL)




### Setting after adjustment

- On the setting menu, set as follows.
  PAGE : LEVEL 7
  ITEM : TEST OUT → ENC

## 8-6. Modulator Balance Adjustment

### Preparation

- WHITE BAL switch (inside panel) → PRST
- OUTPUT/DCC switch (inside panel) → CAM/ON

### Adjustment procedure

1. AUTO W/B BAL switch (front panel) → BLK
   Hold this switch in BLK state untilthe message "−MOD BAL−" on the viewfinder is displayed .

2. A few seconds later after releasing the switch, check that the message "BLACK OK" is displayed on the viewfinder.

# 8-7. TEST SAW Adjustment

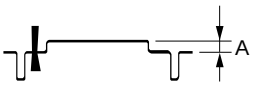
## Preparation

- OUTPUT/DCC switch (inside panel) → CAM/ON
- WHITE BAL switch (inside panel) → PRST

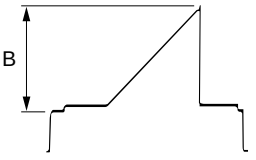
## Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, set as follows.
   PAGE : FUNCTION 1/2
   ITEM : GAMMA → OFF
2. MENU switch (inside panel) → OFF
3. AUTO W/B BAL switch (front panel) → BLK
   (Perform the automatic black balance adjustment.)
4. MENU switch (inside panel) → ON
5. On the setting menu, adjust as follows.
   PAGE : LEVEL 3
   ITEM : MASTER BLACK
   Spec. : A = 8.0 ± 0.2 IRE (NTSC)
   A = 2.0 ±1.0 mV (PAL)




6. On the setting menu, set as follows.
   PAGE : VA ADJ.-1
   ITEM : TEST SAW → ON
7. On the setting menu, set as follows.
   PAGE : VA ADJ.-1
   ITEM : TEST OUT → G
8. On the setting menu, adjust as follows.
   PAGE : VA ADJ.-1
   ITEM : TEST LEVEL
   Spec. : B = 100 ± 2 IRE (NTSC)
   B = 700 ±10 mV (PAL)




## Setting after adjustment

- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : GAMMA → ON
  ITEM : TEST SAW → OFF
  ITEM : TEST OUT → ENC

## 8-8. R/B AD Gain Adjustment

### Note

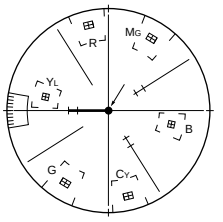
- Never change the setting of “G AD GAIN” during adjustment.

### Preparation

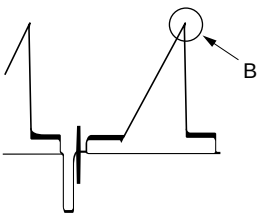
- Connect a waveform monitor to the TEST OUT and vectorscope to the VIDEO OUT connectors respectively.
- WHITE BAL switch (inside panel) → PRST
- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : TEST SAW → ON
  ITEM : GAMMA → OFF
  PAGE : LEVEL 3
  ITEM : KNEE SELECT → OFF

### Adjustment procedure

1. On the setting menu, adjust as follows.
   PAGE : AD ADJ.
   ITEM : R AD GAIN
   Spec. : Adjust the illuminated spot at the center of the vectorscope.




2. On the setting menu, adjust as follows.
   PAGE : AD ADJ.
   ITEM : B AD GAIN
   Spec. : Adjust the illuminated spot at the center of the vectorscope.
3. Repeat steps 1 and 2 several times, adjust the illuminated spot at the center of the vectorscope.
4. Make sure that the carrier leak at portion B is not observed.




### Setting after adjustment

- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : TEST SAW → OFF
  ITEM : GAMMA → ON
  PAGE : LEVEL 3
  ITEM : KNEE SELECT → 1

## 8-9. VA Gain Adjustment

### Note

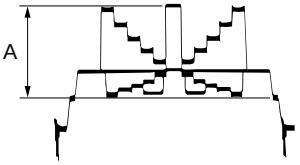
- When change the color temperature setting of preset white, perform the Preset White Adjustment (Section 8-10).
- Use a reflective chart (Reflection rate: 89.9 %) in this adjustment as possible. Adjust the color temperature to 3200 K exactly. If a pattern box is used, check it's state before use. Set the luminous intensity of the chart to 2000 lx.

### Preparation

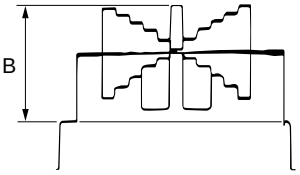
- OUTPUT/DCC switch (inside panel) → CAM/ON
- Shoot a gray-scale chart in the full underscan's picture frame.
- WHITE BAL switch (inside panel) → PRST
- AUTO W/B BAL switch (front panel) → BLK (Perform the automatic black balance adjustment.)
- On the setting menu, set as follows.
  PAGE : WHT PRESET
  ITEM : R WHT PRESET → 0
  ITEM : B WHT PRESET → 0

### Adjustment procedure

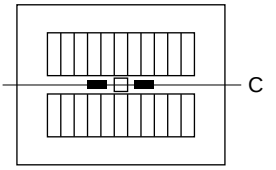
1. Equipment : Oscilloscope
   Test point : TP1/VA-167
   Setting point : ⊘ Lens IRIS
   Spec. : A = 400 ± 8 mV




2. On the setting menu, set as follows.
   PAGE : FUNCTION 1/2
   ITEM : TEST OUT → G



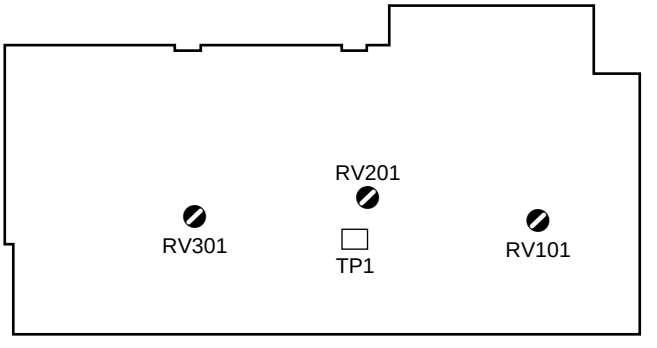

3. Equipment : Waveform monitor
   Test point : TEST OUT connector (inside panel)
   Adj. point : ⊘RV201/VA-167
   Spec. : B = 100 ± 2 IRE (NTSC)
   B = 700 ±10 mV (PAL)
4. On the setting menu, set as follows.
   PAGE : FUNCTION 1/2
   ITEM : TEST OUT → ENC
   ITEM : GAMMA → OFF
5. Select portion C by using the waveform monitor.




6. Set the waveform monitor to the CHROMA mode.
7. Equipment : Waveform monitor
   Test point : TEST OUT connector (inside panel)
   Adj. point : ⊘RV101/VA-167
   ⊘RV301/VA-167
   Spec. : Minimize carrier leak D by using the variable resistors alternately.

### Setting after adjustment

- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : GAMMA → ON




VA-167 Board (A side)

## 8-10. Preset White Adjustment

### Note

- Only when changing the color temperature setting of preset white (PRST), perform this adjustment.

### Preparation

- OUTPUT/DCC switch (inside panel) → CAM/ON
- Shoot a white pattern of color temperature to suit the customer's preferences.

### Adjustment procedure

Test point: TEST OUT connector

1. Equipment : Waveform monitor
   setting point : ⊘ Lens IRIS
   Spec. : A = 90 ± 2 IRE (NTSC)
   A = 630 ±10 mV (PAL)

- On the setting menu, set as follows.
  PAGE : WHT PRESET
  ITEM : R WHT PRESET
  ITEM : B WHT PRESET
  Spec. : Adjust alternately until the carrier in the white pattern area is not observed.

## 8-11. Shading Adjustment

### 8-11-1. Black Shading Adjustment

### Preparation

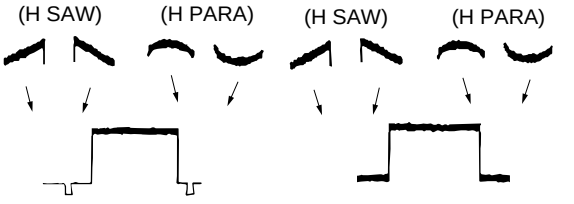
- Lens IRIS → CLOSE
- Waveform monitor setting
  LUM mode
  VOLT FULL SCALE range → 0.5

### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, set as follows.
   PAGE : B-SHAD_G
   ITEM : TEST OUT → G
2. Make the waveform to flat by rotary encoder according to the table below.
3. Adjust the shading for R and B channels in the same way.

| | TEST OUT | H SAW | V SAW | H PARA | V PARA |
|---|---|---|---|---|---|
| G | B-SHAD_G<br>TEST OUT → G | B-SHAD_G<br>H SAW | B-SHAD_G<br>V SAW | B-SHAD_G<br>H PARA | B-SHAD_G<br>V PARA |
| R | B-SHAD_R<br>TEST OUT → R | B-SHAD_R<br>H SAW | B-SHAD_R<br>V SAW | B-SHAD_R<br>H PARA | B-SHAD_R<br>V PARA |
| B | B-SHAD_B<br>TEST OUT → B | B-SHAD_B<br>H SAW | B-SHAD_B<br>V SAW | B-SHAD_B<br>H PARA | B-SHAD_B<br>V PARA |




### Setting after adjustment

- On the setting menu, set as follows.
  PAGE : B-SHAD_B
  ITEM : TEST OUT → ENC

## 8-11-2. White Shading Adjustment

### Preparation

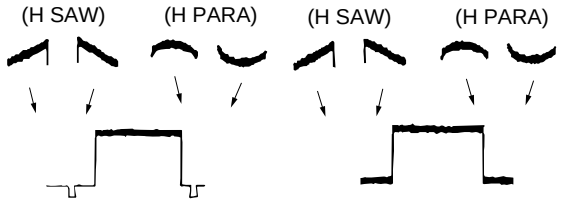
- Lens IRIS → AUTO
- Shoot a fully occupied white area of pattern box in the underscan's picture frame.
- Waveform monitor setting
  LUM mode
  VOLT FULL SCALE range → 0.5

### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, set as follows.
   PAGE : W-SHAD_G
   ITEM : TEST OUT → G
2. Make the waveform to flat by UP and/or DOWN button on the inside panel according to the table below.
3. Adjust the shading for R and B channels in the same way.

| | TEST OUT | H SAW | V SAW | H PARA | V PARA |
|---|---|---|---|---|---|
| G | W-SHAD_G<br>TEST OUT → G | W-SHAD_G<br>H SAW | W-SHAD_G<br>V SAW | W-SHAD_G<br>H PARA | W-SHAD_G<br>V PARA |
| R | W-SHAD_R<br>TEST OUT → R | W-SHAD_R<br>H SAW | W-SHAD_R<br>V SAW | W-SHAD_R<br>H PARA | W-SHAD_R<br>V PARA |
| B | W-SHAD_B<br>TEST OUT → B | W-SHAD_B<br>H SAW | W-SHAD_B<br>V SAW | W-SHAD_B<br>H PARA | W-SHAD_B<br>V PARA |




4. Set the lens to EXTENDER and adjust in the same way.

| | TEST OUT | H SAW | V SAW | H PARA | V PARA |
|---|---|---|---|---|---|
| G | W-SHAD_G<br>TEST OUT → G<br>(EXT) | W-SHAD_G<br>H SAW<br>(EXT) | W-SHAD_G<br>V SAW<br>(EXT) | W-SHAD_G<br>H PARA<br>(EXT) | W-SHAD_G<br>V PARA |
| R | W-SHAD_R<br>TEST OUT → R<br>(EXT) | W-SHAD_R<br>H SAW<br>(EXT) | W-SHAD_R<br>V SAW<br>(EXT) | W-SHAD_R<br>H PARA<br>(EXT) | W-SHAD_R<br>V PARA |
| B | W-SHAD_B<br>TEST OUT → B<br>(EXT) | W-SHAD_B<br>H SAW<br>(EXT) | W-SHAD_B<br>V SAW<br>(EXT) | W-SHAD_B<br>H PARA<br>(EXT) | W-SHAD_B<br>V PARA |

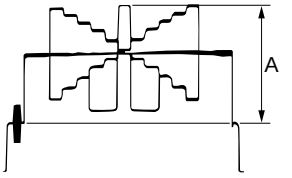
### Setting after adjustment

- On the setting menu, set as follows.
  PAGE : W-SHAD_B
  ITEM : TEST OUT → ENC

## 8-12. Gamma Correction Adjustment

### Preparation

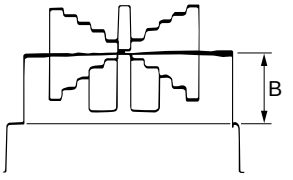
- OUTPUT/DCC switch (inside panel) → CAM/ON
- Shoot a gray-scale chart in the full underscan's picture frame.
  Setting point : ⊘ Lens IRIS
  Spec. : A (white level) = 100 ± 2 IRE



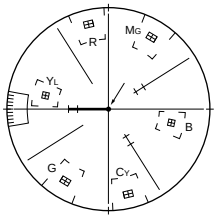

- On the setting menu, set as follows.
  PAGE : LEVEL 6
  ITEM : TEST OUT → G

### Adjustment procedure

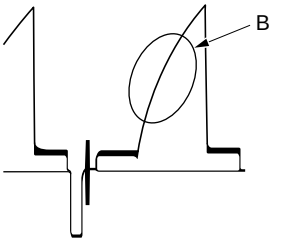
1. On the setting menu, adjust as follows.
   PAGE : LEVEL 3
   ITEM : MASTER GAMMA
   Spec. : B = 63 ± 2 IRE (NTSC)
   B = 420 ±14 mV (PAL)




2. On the setting menu, set as follows.
   PAGE : FUNCTON 1/2
   ITEM : TEST OUT → ENC
   ITEM : TEST SAW → ON
3. On the setting menu, adjust as follows.
   PAGE : LEVEL 6
   ITEM : R GAMMA
   Spec. : Adjust the illuminated spot at the center of the vectorscope.




4. On the setting menu, adjust as follows.
   PAGE : LEVEL 6
   ITEM : B GAMMA
   Spec. : Adjust the illuminated spot at the center of the vectorscope.
5. Repeat steps 3 and 4 several times, adjust the illuminated spot at the center of the vectorscope.
6. Make sure that the carrier leak at the portion B is not observed.




### Setting after adjustment

- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : TEST SAW → OFF

## 8-13. Black Set Adjustment

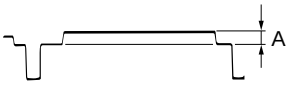
### Preparation

- Lens IRIS → CLOSE
- On the setting menu, set as follows.
  PAGE : LEVEL 6
  ITEM : TEST OUT → G

### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, adjust as follows.
   PAGE : LEVEL 3
   ITEM : MASTER BLACK
   Spec. : A = 10 ±1 IRE (NTSC)
   A = 20 ±7 mV (PAL)



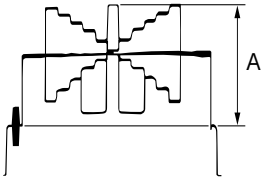

### Setting after adjustment

- On the setting menu, set as follows.
  PAGE : LEVEL 6
  ITEM : TEST OUT → ENC
- MENU switch (inside panel) → OFF
- AUTO W/B BAL switch (front panel) → BLK
  (Perform the automatic black balance adjustment.)

## 8-14. Flare Adjustment

### Preparation

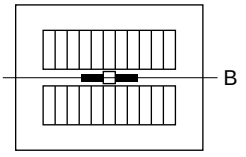
- On the setting menu, set as follows.
  PAGE : LEVEL 6
  ITEM : TEST OUT → ENC
- OUTPUT/DCC switch (inside panel) → CAM/ON
- Shoot a gray-scale chart in the full underscan's picture frame.
  Test point : TEST OUT connector (inside panel)
  Setting point : ⊘ Lens IRIS
  Spec. : Open the lens iris by one step from the reference setting (NTSC: 100 ± 2 IRE, PAL: A = 700 ±14 mV).



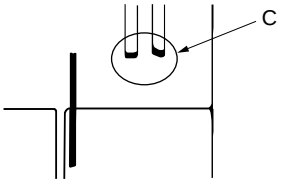

### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, set as follows.
   PAGE : LEVEL 7
   ITEM : G FLARE → 0
2. Select portion C by using the waveform monitor.




3. On the setting menu, adjust as follows.
   PAGE : LEVEL 7
   ITEM : R FLARE
   Spec. : Minimize the carrier leak at portion B




4. On the setting menu, adjust as follows.
   PAGE : LEVEL 7
   ITEM : B FLARE
   Spec. : Minimize the carrier leak at portion B.
5. Repeat steps 3 and 4 several times.

# 8-15. Knee and White Clip Adjustments

## 8-15-1. Manual Knee and White Clip Adjustments

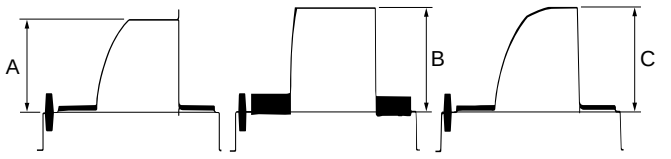
### Preparation

- OUTPUT/DCC switch (inside panel) → CAM/OFF
- WHITE BAL switch (inside panel) → PRST
- GAIN switch (inside panel) → M (9 dB)
- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : TEST SAW → ON
  PAGE : LEVEL 3
  ITEM : WHITE CLIP → OFF

### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, set as follows.
   PAGE : LEVEL 3
   ITEM : KNEE SLOPE 1 → MIN
2. On the setting menu, adjust as follows.
   PAGE : LEVEL 3
   ITEM : KNEE POINT 1
   Spec. : A = 85 ±2 IRE (NTSC)
   A = 595 ±14 mV (PAL)
3. GAIN switch (inside panel) → H (18 dB)
4. On the setting menu, set as follows.
   PAGE : LEVEL 3
   ITEM : WHITE CLIP → ON
   ITEM : KNEE SLOPE 1 → MAX
5. On the setting menu, adjust as follows.
   PAGE : LEVEL 3
   ITEM : WHT CLIP LEVEL
   Spec. : B = 107 ± 2 IRE (NTSC)
   B = 735 ±10 mV (PAL)
6. GAIN switch (inside panel) → M (9 dB)
7. On the setting menu, set as follows.
   PAGE : LEVEL 3
   ITEM : WHITE CLIP → OFF
8. On the setting menu, adjust as follows.
   PAGE : LEVEL 3
   ITEM : KNEE SLOPE
   Spec. : C = 109 ± 2 IRE (NTSC)
   C = 763 ±14 mV (PAL)




### Setting after adjustment

- GAIN switch (inside panel) → L (0 dB)
- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : TEST SAW → OFF
  PAGE : LEVEL 3
  ITEM : WHITE CLIP → ON

**Note**

The values used in the above adjustment are for the conditions that the white clip level is set to 109 IRE (763 mV). When the white clip level is set to a value other than 109 IRE (763 mV), equate these values of knee slope adjustment and white clip adjustment.

http://getMANUAL.com



## 8-15-2. Pre Knee Adjustment

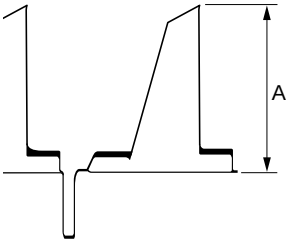
### Preparation

- OUTPUT/DCC switch (inside panel) → CAM/OFF
- GAIN switch (inside panel) → M (9 dB)
- WHITE BAL switch (inside panel) → PRST
- On the setting menu, set as follows.

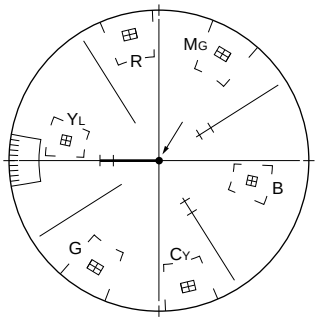
  PAGE : LEVEL 3
  ITEM : WHITE CLIP → OFF
  PAGE : FUNCTION 1/2
  ITEM : TEST OUT → G
  ITEM : GAMMA → OFF
  ITEM : TEST SAW → ON

### Adjustment procedure

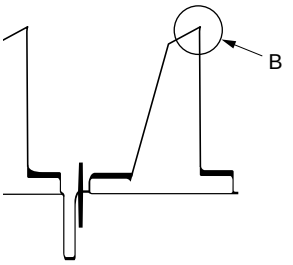
1. On the setting menu, adjust as follows.
   PAGE : VA ADJ.-2
   ITEM : G PREKNEE
   Spec. : A = 100 ±2 IRE (NTSC)
   A = 700 ±14 mV (PAL)




2. On the setting menu, set as follows.
   PAGE : VA ADJ.-2
   ITEM : TEST OUT → ENC
3. On the setting menu, adjust as follows.
   PAGE : VA ADJ.-2
   ITEM : R PREKNEE
   Spec. : Adjust the illuminated spot at the center of the vectorscope.




4. On the setting menu, adjust as follows.
   PAGE : VA ADJ.-2
   ITEM : B PREKNEE
   Spec. : Adjust the illuminated spot at the center of the vectorscope.
5. Repeat steps 3 and 4 several times, adjust the illuminated spot at the center of the vectorscope.
6. Make sure that the carrier leak at portion B is minimum.




### Setting after adjustment

PAGE : FUNCTION 1/2
ITEM : GAMMA → ON
ITEM : TEST SAW → ON
PAGE : LEVEL 3
ITEM : WHITE CLIP → ON

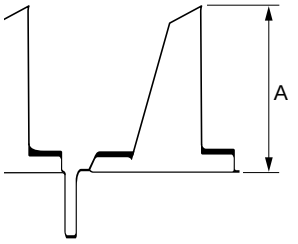
## 8-15-3. DCC Pre Knee Adjustment

### Preparation

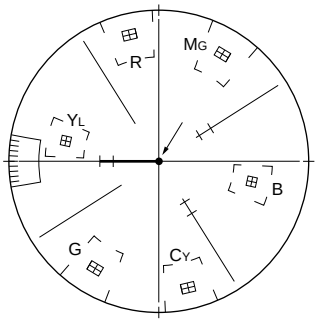
- OUTPUT/DCC switch (inside panel) → CAM/OFF
- GAIN switch (inside panel) → M (9 dB)
- WHITE BAL switch (inside panel) → PRST
- On the setting menu, set as follows.
  PAGE : LEVEL 3
  ITEM : WHITE CLIP → OFF
  PAGE : FUNCTION 1/2
  ITEM : TEST OUT → G
  ITEM : GAMMA → OFF
  ITEM : TEST SAW → ON

### Adjustment procedure

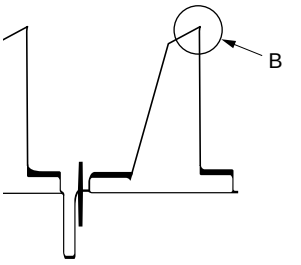
1. On the setting menu, adjust as follows.
   PAGE : VA ADJ.-2
   ITEM : G PREKNEE (DCC)
   Spec. : A = 100 ±2 IRE (NTSC)
   A = 700 ±14 mV (PAL)




2. On the setting menu, set as follows.
   PAGE : VA ADJ.-2
   ITEM : TEST OUT → ENC
3. On the setting menu, adjust as follows.
   PAGE : VA ADJ.-2
   ITEM : R PREKNEE (DCC)
   Spec. : Adjust the illuminated spot at the center of the vectorscope.




4. On the setting menu, adjust as follows.
   PAGE : VA ADJ.-2
   ITEM : B PREKNEE (DCC)
   Spec. : Adjust the illuminated spot at the center of the vectorscope.
5. Repeat steps 3 and 4 several times, adjust the illuminated spot at the center of the vectorscope.
6. Make sure that the carrier leak at portion B is minimum.




### Setting after adjustment

PAGE : FUNCTION 1/2
ITEM : GAMMA → ON
ITEM : TEST SAW → OFF
PAGE : LEVEL 3
ITEM : WHITE CLIP → ON

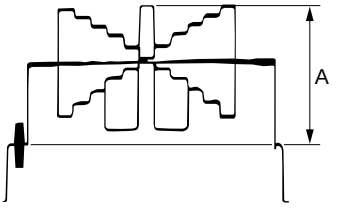
## 8-15-4. DCC Knee Adjustment

### Note

- Perform this adjustment, if necessary, to suit the customer's preferences.

### Preparation

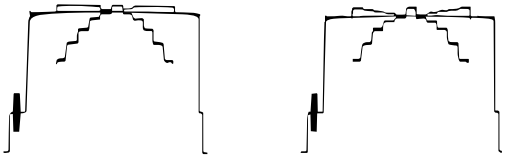
- WHITE BAL switch (inside panel) → PRST
- On the setting menu, set as follows.
  PAGE : DCC ADJ.
  ITEM : POINT → 0
  ITEM : GAIN → 0
- OUTPUT/DCC switch (inside panel) → CAM/ON
- Shoot a gray-scale chart in the full underscan's picture frame.
- AUTO W/B BAL switch (front panel) → WHT
  (Perform the automatic white balance adjustment.)
- Setting point : ⊘ Lens IRIS
  Spec. : Open the lens iris by 2.5 steps from the reference setting (NTSC: A = 100 ± 2 IRE, PAL: A = 700 ±14 mV).




### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, adjust as follows.
   PAGE : DCC ADJ.
   ITEM : D RANGE (Factory setting: 0)
   Spec. : Set the desired dynamic range.
2. On the setting menu, adjust as follows.
   PAGE : DCC ADJ.
   ITEM : POINT (Factory setting: 0)
   Spec. : Set the desired knee characteristics.
3. Enter the extender mode, shoot a gray-scale chart in the full underscan's picture frame.
4. Exit the extender mode.
5. On the setting menu, adjust as follows.
   PAGE : DCC ADJ.
   ITEM : GAIN (Factory setting: 0)
   Spec. : Set the desired knee characteristics.



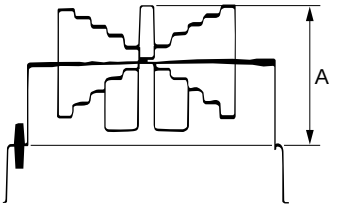
(300%) (600%)

## 8-16. Detail Signal Adjustment

## 8-16-1. Crispening Adjustment

### Preparation

- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : DETAIL → ON
- OUTPUT/DCC switch (inside panel) → CAM/ON
- Shoot a gray-scale chart in the full underscan's picture frame.
  Setting point : ⊘ Lens IRIS
  Spec. : A = 100 ± 2 IRE (NTSC)
  A = 700 ±14 mV (PAL)




### Adjustment procedure

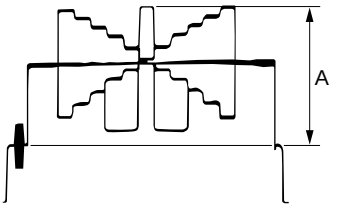
Equipment : Black and white monitor
Test point : TEST OUT connector

1. On the setting menu, adjust as follows.
   PAGE : LEVEL 1
   ITEM : CRISPENING
   Spec. : Reduce the noise on the screen to a permissible level.

## 8-16-2. Level Depandent Adjustment

### Preparation

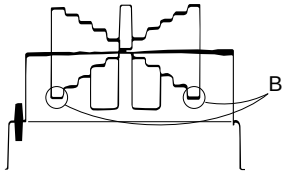
- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : DETAIL → ON
  ITEM : TEST OUT → ENC
- OUTPUT/DCC switch (inside panel) → CAM/ON
- Shoot a gray-scale chart in the full underscan's picture frame.
  Setting point : ⊘ Lens IRIS
  Spec. : A = 100 ± 2 IRE (NTSC)
  A = 700 ±14 mV (PAL)




### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, adjust as follows.
   PAGE : LEVEL 1
   ITEM : LEVEL DEPEND
   Spec. : Eliminate the detail signal from portion B.




### Note

- After this adjustment, be sure to perform 8-16-4. H/V Ratio Adjustment, and 8-16-5. Detail Level Adjustment, in that order.

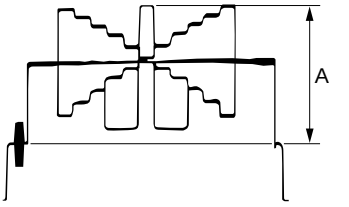
## 8-16-3. Detail Frequency Adjustment

### Note

- Perform this adjustment, if necessary, to suit the customer's preferences.

### Preparation

- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : DETAIL → ON
  ITEM : TEST OUT → ENC
- OUTPUT/DCC switch (inside panel) → CAM/ON
- Shoot a gray-scale chart in the full underscan's picture frame.
  Setting point : ⊘ Lens IRIS
  Spec. : A = 100 ± 2 IRE (NTSC)
  A = 700 ±14 mV (PAL)

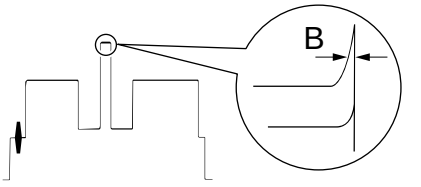



- Select the line at the center white portion of the gray-scale chart.

### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, adjust as follows.
   PAGE : LEVEL 1
   ITEM : DTL FREQ. (Factory setting: 0)
   Spec. : Set the desired width at the edge of portion B.



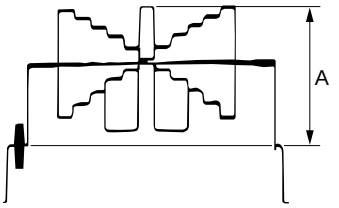

### Note

- After this adjustment, be sure to perform 8-16-4. H/V Ratio Adjustment, and 8-16-5. Detail Level Adjustment, in that order.

## 8-16-4. H/V Ratio Adjustment

### Preparation

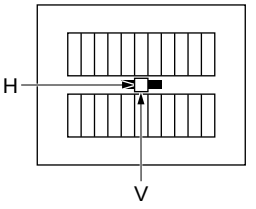
- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : DETAIL → ON
  ITEM : TEST OUT → ENC
- OUTPUT/DCC switch (inside panel) → CAM/ON
- Shoot a gray-scale chart in the full underscan's picture frame.
  Setting point : ⊘ Lens IRIS
  Spec. : A = 100 ± 2 IRE (NTSC)
  A = 700 ±14 mV (PAL)




### Adjustment procedure

Equipment: Black and white monitor
Test point: TEST OUT connector

1. On the setting menu, adjust as follows.
   PAGE : LEVEL 1
   ITEM : V DTL LEVEL
   Spec. : Adjust so that the H and V detail amounts which are added are equivalent.



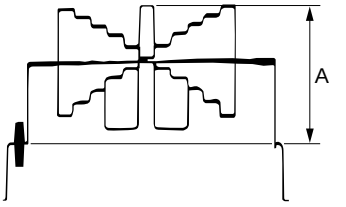

## 8-16-5. Detail Level Adjustment

### Note

- Perform this adjustment, if necessary, to suit the customer's preferences.

### Preparation

- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : DETAIL → ON
  ITEM : TEST OUT → ENC
- Shoot a gray-scale chart in the full underscan's picture frame.
  Setting point : ⊘ Lens IRIS
  Spec. : A = 80 ± 2 IRE (NTSC)
  A = 560 ±14 mV (PAL)




### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, adjust as follows.
   PAGE : LEVEL 1
   ITEM : DETAIL LEVEL (Factory setting: 0)
   Spec. : Set to the detail signal which is added to each step in the gray-scale chart.

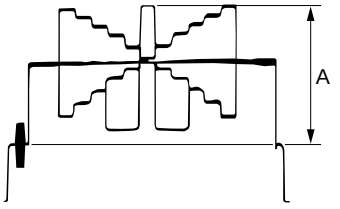
## 8-16-6. Knee Aperture Adjustment

### Note

- Perform this adjustment, if necessary, to suit the customer's preferences.

### Preparation

- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : DETAIL → ON
  ITEM : TEST OUT → ENC
- OUTPUT/DCC switch (inside panel) → CAM/ON
- Shoot a gray-scale chart in the full underscan's picture frame.
  Setting point : ⊘ Lens IRIS
  Spec. : A = 100 ± 2 IRE (NTSC)
  A = 700 ±14 mV (PAL)

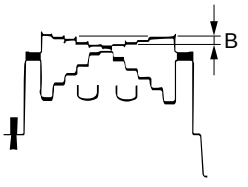



- GAIN switch (inside panel) → M (9 dB)

### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, adjust as follows.
   PAGE : LEVEL 1
   ITEM : KNEE APERTURE
   Spec. : Adjust the peak-to-peak level of the noise at the third steps from the top (portion B) in the gray-scale chart, as desired. (Reference level is 40 mV)



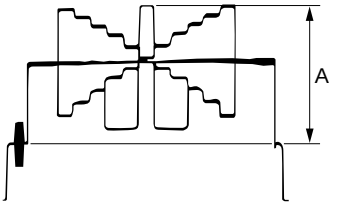

## 8-16-7. H Detail Clip Adjustment

### Note

- Perform this adjustment, if necessary, to suit the customer's preferences.

### Preparation

- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : DETAIL → ON
  ITEM : TEST OUT → ENC
- OUTPUT/DCC switch (inside panel) → CAM/ON
- Shoot a gray-scale chart in the full underscan's picture frame.
  Setting point : ⊘ Lens IRIS
  Spec. : Open the lens iris by one step from the reference setting (NTSC: 100 ± 2 IRE, PAL: A = 700 ±14 mV).

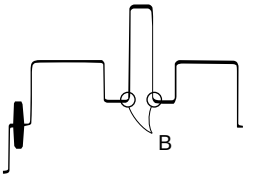



- Select the line at the center white portion of the gray-scale chart.

### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, adjust as follows.
   PAGE : LEVEL 1
   ITEM : DTL BLK CLIP (Factory setting: 0)
   Spec. : Set the edges of portion B to the desired clip level.



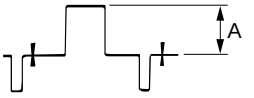
## 8-16-8. V Detail Clip Adjustment

### Note

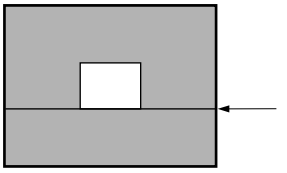
- Perform this adjustment, if necessary, to suit the customer's preferences.

### Preparation

- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : DETAIL → ON
  ITEM : TEST OUT → ENC
- OUTPUT/DCC switch (inside panel) → CAM/ON
- Shoot a white window chart in the full underscan's picture frame.
  Setting point : ⊘ Lens IRIS
  Spec. : Open the lens iris by one step from the reference setting (NTSC: 100 ± 2 IRE, PAL: A = 700 ±14 mV).




- Select the line at the bottom of the center white portion in the white window chart.



### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, adjust as follows.
   PAGE : LEVEL 1
   ITEM : V DTL BLK CLIP (Factory setting: 0)
   Spec. : Set the level of portion B to the desired level.

## 8-17. Skin Tone Adjustment

### Note

- Perform this adjustment, if necessary, to suit the customer's preferences.

### Preparation

- On the setting menu, set as follows.
  PAGE : LEVEL 2
  ITEM : SKIN TONE DTL → ON
  ITEM : SKIN TONE IND. → ON
- Shoot a person's face.

### Adjustment procedure

Test point: TEST OUT, VIDEO OUT connector

1. On the setting menu, set as follows.
   PAGE : LEVEL 2
   ITEM : SKIN TONE DET → ON
2. Shoot a person's face in the central of the viewfinder.
3. Push the rotary switch (front panel).
   (Display the detect area in zebra pattern.)
4. Perform the adjustment in this step, if neccessary.
   On the setting menu, adjust as follows.
   PAGE : LEVEL 2
   ITEM : X : Component of red (center)
   Y : Component of blue (center)
   dX : Component of red (range)
   dY : Component of blue (range)
   Display the skin detail detect area in zebra pattern.
   Adjust zebra pattern displays only normal area.
5. On the setting menu, adjust as follows.
   PAGE : LEVEL 2
   ITEM : SUPPRESS LEVEL (Factory setting: 0)
   Spec. : Set the level to the desired detail level.

### Setting after adjustment

PAGE : LEVEL 2
ITEM : SKIN TONE DTL → OFF
ITEM : SKIN TONE IND. → OFF
ITEM : SKIN TONE DET → OFF

## 8-18. Zebra Adjustment

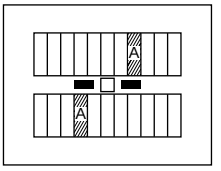
### Preparation

- ZEBRA switch (viewfinder) → ON
- On the setting menu, set as follows.
  PAGE : FUNCTION 1/2
  ITEM : TEST OUT → R, G or B
  PAGE : VF SETTING
  ITEM : ZEBRA SELECT → 1
  ITEM : ZEBRA1 APT → MIN
- OUTPUT/DCC switch (inside panel) → CAM/ON
- Shoot a gray-scale chart in the full underscan's picture frame.
  Setting point : ⊘ Lens IRIS
  Spec. : A = 100 ± 2 IRE (NTSC)
  A = 700 ±14 mV (PAL)

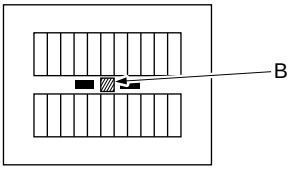
### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, adjust as follows.
   PAGE : VF SETTING
   ITEM : ZEBRA1 DETECT
   Spec. : Set the condition that zebra pattern appear at the portions A.




2. On the setting menu, set as follows.
   PAGE : FUNCTION 1/2
   ITEM : TEST SAW → ON
3. On the setting menu, adjust as follows.
   PAGE : VF SETTING
   ITEM : ZEBRA1 APT (Factory setting: 0)
   Spec. : Set the desired width of detection.
4. On the setting menu, set as follows.
   PAGE : FUNCTION 1/2
   ITEM : TEST SAW → OFF
5. On the setting menu, set as follows.
   PAGE : VF SETTING
   ITEM : ZEBRA SELECT → 2
6. On the setting menu, adjust as follows.
   PAGE : VF SETTING
   ITEM : ZEBRA2 DETECT
   Spec. : Set the condition that zebra pattern appear at the portion B.




### Setting after adjustment

PAGE : VF SETTING
ITEM : ZEBRA SELECT → 1

## 8-19. Automatic Iris Adjustment

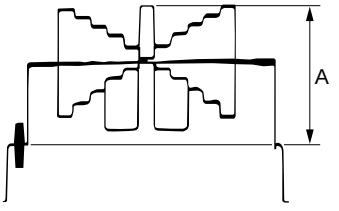
### Preparation

- On the setting menu, set as follows.
  PAGE : LEVEL 7
  ITEM : TEST OUT → ENC
- OUTPUT/DCC switch (inside panel) → CAM/ON
- Shoot a gray-scale chart in the full underscan's picture frame.
- Lens IRIS → AUTO

### Adjustment procedure

Test point: TEST OUT connector

1. On the setting menu, adjust as follows.
   PAGE : LEVEL 9
   ITEM : IRIS MODE
   Spec. : Set the automatic iris operation mode depending on the application.
   Automatic iris operation mode setting can be done from the average level to peak-to-peak level of the video signal.
   IRIS MODE = MIN → peak-to-peak level
   IRIS MODE = MAX → average level
2. On the setting menu, adjust as follows.
   PAGE : LEVEL 9
   ITEM : IRIS SET
   Spec. : A = 100 ± 2 IRE (NTSC)
   A = 700 ±14 mV (PAL)




3. On the setting menu, set as follows.
   PAGE : LEVEL 9
   ITEM : IRIS WEIGHT → 0 (MIN)
4. Shoot a avoid working area of auto iris in the white window chart?
5. On the setting menu, adjust as follows.
   PAGE : LEVEL 9
   ITEM : IRIS WEIGHT
   Spec. : Increment the IRIS WEIGHT value until the lens iris is open.
6. On the setting menu, adjust as follows.
   PAGE : LEVEL 9
   ITEM : IRIS SPEED (Factory setting: 0)
   Spec. : Set to the desired operation speed of auto iris.

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